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NATURAL HISTORY TRANSACTIONS

OF

NORTHUMBERLAND AND DURHAM;

BEING PAPERS READ AT THE

MEETINGS OF THE NATURAL HISTORY SOCIETY

OF

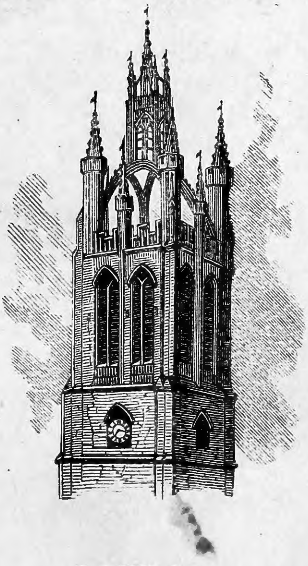
NORTHUMBERLAND, DURHAM, AND NEWCASTLE-UPON-TYNE,

AND THE

TYNESIDE NATURALISTS' FIELD CLUB,

1873-76.

VOL. V.



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THE Committees of the two Societies beg to state that the Authors alone are responsible for the facts and opinions entertained in their respective papers.

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NATURAL HISTORY TRANSACTIONS

OF

NORTHUMBERLAND AND DURHAM.

ADDRESS TO THE MEMBERS OF THE TYNESIDE NATURALISTS' FIELD CLUB,

READ BY THE PRESIDENT, HENRY B. BRADY, ESQ., F.L.S., AT THE TWENTY-SEVENTH ANNIVERSARY MEETING, HELD IN THE MUSEUM OF THE NATURAL HISTORY SOCIETY, NEWCASTLE-UPON-TYNE, ON THURSDAY, APRIL 17TH, 1873.

GENTLEMEN,—The duty of your President, at the termination of his year of office, as laid down by rule and confirmed by six and twenty years practice, is to deliver an address to the members of the Club containing primarily "a written summary of its proceedings at the several Field Meetings." In the early days of the Club the minutes of the Committee relating to each Field Meeting, which were then very full and copious, supplied a ground-work which required little beyond connective matter and a few supplementary reflections, to fashion it into the prescribed form. By degrees however changes have crept in, and now, as for many years past, the annual address has become almost the only recognised communication, except the Treasurer's periodical statement, between the executive and the general body of members.

To begin then, according to precedent, with our retrospect.

The year which has passed since our last general meeting cannot in any sense be said to have been a favourable one for out-door pursuits. The attendance at the Field Meetings depends primarily on settled fine weather, a desideratum we shall look for in vain in the Meteorological Report for 1872, the characteristics of which might be summed up in the words *rain*, *wind*, and *cold*. The selection of field-days however was fortunate, and very few of the excursions were marred by unfavourable weather, though the numbers present were frequently diminished by threatening eve or lowering morning sky.

First Field Meeting.—Our campaign was opened as usual by a half-day excursion. From its easy accessibility Bothal had been selected as the place of meeting, and the day fixed was the 22nd of May. Spring had not set in auspiciously. The sharp frosts of the nights of the 16th and 18th of May had nipped vegetation in many parts of our district, and there had been little indication of holiday weather, nor was the day itself promising. Notwithstanding, there was a fair muster of members at the Central Station, though the faith of a few failed before they reached Morpeth, and at Choppington the party was somewhat lessened by desertions. The walk from Choppington to Sheepwash and thence to Bothal Castle is known to all of you, and the experience of that particular day would perhaps add nothing to your knowledge, for the chief part of the journey was performed under umbrellas. We were not sorry, in the absence of a village inn (a noteworthy defect in any village), to gain the substantial shelter of the Castle archway, and the interior of the old Church. But little is left of the Castle except this fortified gateway, with its two towers and portcullis, and a few fragments of the old wall—dating back perhaps to the Robert Bertram of the time of Edward III.; nor have these scanty ruins that halo of stirring history which gives a charm to so many of our northern keeps. Their story would chiefly be of the domestic annals of the Ogles of Ogle and their kin—eventful doubtless, but of which few noteworthy incidents have survived the lapse of time. In the Church the alabaster tomb, with its recumbent figures, tells of a Sir Robert Ogle of the 14th century, but this seems the only evidence beyond the Castle walls that the keep and its precincts were once the stronghold of a powerful family.

Meanwhile heavy rain had given place to bright sunshine, and the walk was continued through the woods skirting the Wansbeck to Morpeth—a delightful ramble, but rendered somewhat arduous by the wet and slippery paths. The woods were brilliant with spring flowers; and even in the absence of rarities dear to the botanist, it was no small enjoyment to be once again amongst hyacinths and primroses, woodruff and forget-me-not, lychnis and water avens, Adoxa, Pyrola, and Alchemilla, oak fern, beech fern, and harts-tongue, all shaded by fresh spring foliage picked out with white sprays of the bird-cherry.

Arrived at Morpeth the wanderers soon forgot how tired they were in sight of the liberal provision awaiting them at the Black Bull. The company assembled at the tea-table numbered about seventy. The only business transacted after tea was the election of a dozen new members. The party subsequently sauntered leisurely to the station, and by the evening train returned to Newcastle.

Second Field Meeting.—We met again on the 20th June, this time for a sea-shore ramble. From Christon Bank Station (a two hours tedious railway ride from Newcastle,) as a starting point, a party consisting of about thirty members strolled through the fields to Embleton, thence along the links to Dunstanborough Castle and so by Craster to Longhoughton. The village of Embleton has little to detain the tourist. The church with its grey embattled tower, and the fine old fortified vicarage (one of the original three),* well rewarded the visit paid to them in passing. The birth-place of Duns Scotus, too, which lay on the route southwards, would doubtless have had its interest had there been anyone to point out to which particular house the honour pertained of having provided a worthy opponent to Thomas Aquinas. It was a splendid day. The grassy links south of Embleton, covered with *Geranium sanguineum* in full bloom, were gay and

* The other two Northumbrian fortified vicarages being Whitton and Elsdon.

brilliant in the sunshine, the Castle crowning its grim basaltic cliff stood out black and clear, the mid distance presenting a varied aspect of rock, and stony beach, and grassy slope. There are few such landscapes even on our Northumbrian coast. The Castle ruin seemed to beckon on the party in spite of their collecting instincts, else more time might have been spent with advantage in exploring the botanical treasures of the coarse herbage of the links. Of the Castle much might, but little need, be said. It is told of alike in legend and in history: stories of rebellion and of battle, of beleaguered fortress and fugitive queen, seem its natural attributes—poets have sung of it and still may—though now, in its solitude, it seems given up to the painter who revels in its material beauty, and to the antiquarian who traces in its walls the wierd story of a past age. The field within the Castle wall, with its delicate pink and white carpet of thrift and daisies, was irresistible, and enthralled by Sir Guy the Seeker, or by the outspread picture of sea and land, the halt might have been indefinitely prolonged but for the work which remained to be done. On setting out again the route lay through the little fishing village of Craster: the party then divided, a few members striking through the Howick woods, the rest keeping to the shore and lanes, meeting again at Longhoughton. A beautiful willow tree in Longhoughton Church-yard was an object of attention whilst dinner was preparing at the village inn. The bole, eleven feet ten inches in circumference, is possibly not so large as other willows which might be found in the county, but it is seldom one meets with a tree in all respects so beautiful.

Amongst the plants found during the day I have notes of the following, none of them however particularly rare:—*Geranium sanguineum*, *Cynoglossum officinale*, *Hyoscyamus niger*, *Plantago maritima*, *Listera ovata*, *Iris pseudacorus*, *Astragalus hypoglottis*, *Orchis mascula*, *Thymus serpyllum*, and *Asplenium marinum*.

After dinner Mr. G. C. Atkinson introduced the subject of the "Remarkable Trees of the Northern Counties," in a brief paper; of this, more will be said shortly. Nine new members were elected before the party set out on their return journey.

Third Field Meeting.—Featherstone Castle was the rendezvous for the Third Field Meeting, and the programme was sufficiently tempting to secure a good attendance. Leaving Newcastle betimes the members arrived at Greenhead after a couple of hours travelling, hungry enough to have appreciated a much less bountiful breakfast than that which had been provided by the host of the Coulson Arms. Mr. Clark, the agent of Hope Wallace, Esq., of Featherstone Castle, was on the platform when the train arrived, and most kindly took the guidance of the day's proceedings: to his foresight and excellent planning much of the enjoyment of the excursion was due. Breakfast over (it seemed interminable) the route lay westward to Thirlwall Castle, the gloomy ruin of what was once a strong border tower, standing close to the little river Tippald, and in the line of the Roman wall. The party then retraced its steps, turning southward to Blenkinsopp Castle, another ruined border fortress, to which a farm house has in modern times been added, with little of interest left save its legendary association with the family whose name it bears, and its traditional notoriety in border feuds. The vaulted basement still tells of the provision necessary for the protection of the cattle in times when fear and unsettlement were the normal condition of this part of the country. Thence following the road for a mile or two, the entrance to Pinkynscleugh was reached, a delightful woody glen, every turn of which became enchanted ground, with our worthy guide's recital of the legends of knight and fair lady, of witch and fairy, proper to the spot—tales too wondrous not to be true, and whilst under the influence of the scene itself, admitting no shade of doubt. Emerging from the wood close to Greensilhaugh, the site of the ancient burial ground was visited, and the oak coffins and other prehistoric remains which had been exhumed, were examined with extreme interest. Mr. Clark narrated the circumstances which had led to their discovery, and described the investigations which had taken place in 1859 and 1869, with a view of obtaining more accurate knowledge of the area and extent of the burial ground, the nature of the interments, and any possible clue as to their historic age. I am constrained to add a few particulars, culled from a paper recently communicated to the Society of Antiquaries, by T. W. Snagge, Esq., M.A.,* on a subject of so much local interest.

In the year 1825 some labourers who were employed in draining the field, which is still somewhat swampy, came upon what seemed to be part of the trunk of an oak tree. Finding that it impeded the progress of their work they endeavoured to cut it out with an axe, when to their surprise they found that the trunk was hollow and contained human bones. Subsequently they found the remains of four similar wooden shells and reported that there were several others all lying north and south, and about five feet below the surface of the ground. Beyond the account contained in letters from Mr. Hutton and Colonel Coulson to the Antiquarian Society of Newcastle, no notice appears to have been taken of the discovery, and the matter was almost forgotten when, in 1859, another oaken shell, like the former ones, was found by Mr. Clark in the same field. In 1863, at the instance of one of our late Presidents, the Rev. Canon Greenwell, another search was made, and again a coffin was found, this time containing a skull in fair preservation, and in 1869, at the request of Mr. Snagge, from whose paper I quote, a careful exploration of the whole field was made. It was ascertained, chiefly by means of a boring rod, that a large number of the coffins existed, and one in perfect condition was exhumed,—that which we saw. Like those found in 1825 it consisted of the trunk of an oak tree, rudely split from end to end—the ends rounded somewhat, probably in the process of severing the log, rather than with any intention of reducing it to shapeliness. The two halves, which of course fitted accurately, had been fastened together by means of two oaken pegs driven into holes at each end. The interior presented a cavity of about five feet eleven inches, by nineteen inches, rudely shaped. The tool marks all appeared to be produced by striking instruments; some apparently were those of a flat-edged but very rude tool about four inches broad, but the great number seemed referrible to instruments of the

* From the "Archæologia," Vol. XLIV. It seems a pity that this paper should not have been reprinted in our Transactions—these paragraphs form a very imperfect abstract of it.

arrow-head shape. A knot hole had been patched, by rivetting on a flat plate of oak with wooden pegs.

Similar oaken coffins have been found, though rarely, both in England and Scotland, but there seems no close agreement amongst antiquaries as to their age.* It is interesting to observe in connection with this locality, that it lies within two hundred yards of the South Tyne, that the level of the interments is below that of the river, and that the soil is a sandy river silt. Further, there can be little doubt that at no very remote period this boggy ground must have formed an outspread reach of the river and have been continually under water. It is also known to have been part of what was called, in a deed dated A.D. 1223, "the Temple Land," and it is somewhat remarkable that a charge of nineteen shillings per annum was payable to the Dean and Chapter of Carlisle in respect to this very field, being, it is said, the only property of the kind in the county of Northumberland possessed by that body. Upon this charge being redeemed a year or two ago there was no title to show for it other than prescription.

There remained but a short walk by the river side to Featherstone Castle, when the party were courteously received by its owner, Hope Wallace, Esq. The building is an ancient keep to which a modern castellated mansion has been added. It is prettily situated in a sheltered spot near the South Tyne, and its quaint walled-in garden and shady walks were a pleasant resting place in the mid-day sun. Thence by the woods to Burnfoot, and by the high road overlooking the valley of the Tyne to Bellister Castle, and so to Haltwhistle.

There is but little to record in respect of botanical or other spoils. I have memoranda of a few plants gathered on the walk none of them rare, *viz.*:—*Epipactis latifolia*, *Parnassia palustris*, *Arenaria verna*, *Armeria maritima*, *Sempervivum tectorum*, *Campanula latifolia*, *Lysimachia nemorum*, and the white flowered

* Mr. Snagge (*loc. cit.*) mentions amongst other evidences bearing on the question of age, the discovery of similar remains at Gristhorpe, near Scarborough, which Mr. Wright has assigned to a period not earlier than two or three centuries before, nor later than the first century of our era.

variety of *Ajuga reptans;* also, *Polypodium vulgare*, *P. phegopteris*, and *P. dryopteris*.

But although the district traversed presents little that is remarkable in fauna or flora, it is scarcely to be surpassed, even in the border country, in richness of historic and legendary association. The annals of Thirlwall Castle go back to 1306, when Edward I. made it a resting place for a night, and thenceforward its story is connected with the vicissitudes of the Blenkinsopps. Blenkinsopp Castle, built in 1339, the ancient residence of the family (now represented by the Coulsons), with its traditions of Bryan Blenkenshope and the White Lady, had even in 1542 fallen into decay, and was before that time deserted for the neighbouring family fortress Bellister Castle. Featherstone Castle, probably dating back further than any of them, was the stronghold of the Featherstonehaughs, and thereby connected with the Royalist cause in the wars of the Commonwealth. "Mumps Ha'," too, is on the route; and are not the meeting of Dandy Dinmont and Meg Merrilies, and the story of Ellangowan's death, as good as much that is called history? And just beyond Featherstone is the spot where that murder took place in 1530, so quaintly told in Surtees's famous ballad—

"Hoot awa', lads, hoot awa',
Ha' ye heard how the Ridleys and Thirlwalls and a',
Ha' set upon Albany Featherstonhaugh,
And taken his life at the Deadman's shaw?
There's was Willimoteswick,
And Hardriding Dick,
And Hughie of Hawden and Will o' the Wa',
I canno' tell a', I canno' tell a',
And mony a mair that the deil may knaw."

and so forth through half a dozen stanzas.

Then, oldest of all, and far the most interesting, the Roman Wall, one point of which was visited by a few energetic members early on in the day, and whose course was traceable for miles from several places on our route. Surely I have not overestimated the antiquarian wealth of the district.

Seventy-three members sat down to dinner, which was provided at the Sun Inn, at Haltwhistle. Afterwards Mr.

Thompson exhibited eight eggs of the Woodcock (*Scolopax rusticola*), and two eggs of the Night-jar (*Caprimulgus europæus*), taken near Riding Mill. A letter and circular from Sir Walter Elliot, on behalf of a sub-committee of the British Association, appointed to consider the question of the better organization of local scientific societies, were read, and the President was requested to attend a meeting, which it was proposed should be held at Brighton in August, for the discussion of the subject. A cordial vote of thanks to Mr. Clark, for his kindness in guiding the party during the day was passed, and ten new members were elected. The company left for Newcastle by train at 7·23 in the evening.

Fourth Field Meeting.—Owing to unforeseen difficulties, it was found impossible to arrange an excursion to Fallowlees and Chartners Loughs, as set down for the Fourth Field Meeting. These little lakes are somewhat inaccessible under the most favourable circumstances, and the awkward running of the trains precluded any chance of the proposed round being included comfortably in one day. After much deliberation it was determined to take the neighbouring district of Bolam instead of that originally intended, and the meeting on the 5th August was called accordingly. I was unable to be present, and am indebted to Mr. E. C. Robson and the Secretaries for a report of the day's proceedings.

Leaving Newcastle by the morning train the excursionists reached Middleton viâ Morpeth and the Wansbeck Valley line, about half past ten o'clock. Thence they walked to Shaftoe Crags, a wild and picturesque range of rocks, and so to Bolam. The chief part of the day was spent in the woods surrounding the Castle which, with the neighbouring lake, afforded ample occupation to the naturalists of the party, and not less to those whose delight lay merely in the beautiful aspects of nature. The following plants, amongst others, were collected by Mr. Cobb and Mr. E. C. Robson: *Ranunculus hederaceus*, *R. flammula*, *R. lingua*, *Hypericum pulchrum*, *Veronica scutellata*, *Erica cinerea*, *E. tetralix*, *Montia fontana*, *Peplis portula*, *Callitriche* *autumnalis*, *Polygonum amphibium*, *Lotus major*, and *Lonicera caprifolium*. None of these are of particular scarcity. A few birds of interest were noticed; amongst these the Wheatear (*Saxicola œnanthe*), the Heron (*Ardea cinerea*), and on the lake at Bolam the Bald Coot (*Fulica atra*).

Thirty-five in all sat down to dinner, which was provided at the hotel at Gallowshill; afterwards five new members were elected. Mr. Thompson exhibited four eggs of the Tree Pipit (*Anthus arboreus*), and an egg of the Cuckoo (*Cuculus caronus*), taken at Winlaton. Gallowshill is but a short walk from the Meldon Station, where the party again took train for Newcastle.

It is to be regretted that the arrangements of the railway companies do not permit a longer day for country excursions in districts lying as near home as the one visited. With more time the circuit might have been considerably extended without entailing unusual fatigue.

The Fifth Field Meeting was held at Helmsley and Gilling on the 12th and 13th September. The early rule of the Club, under which Field Meetings were confined to the counties of Northumberland and Durham, has been somewhat relaxed of recent years, and it is now usual to extend one of the summer excursions beyond our own borders, granting some corresponding indulgence as to time. It is not that localities nearer home have ceased to delight and instruct, or that it is for a moment supposed that the Natural History of the two counties has been exhausted by our pilgrimages, but, following mother nature in her objection to hard lines of demarcation, we are tempted now and then to wander just a little further afield as access to fresh localities becomes easy by the opening out of new travelling routes.

The two-day excursion of last season was devoted to the portion of North Yorkshire lying directly east of Thirsk,—in other words, to the Hambleton Hills and a part of Ryedale. The programme lacked nothing in attractiveness, and it was probably want of faith in the weather that alone prevented a large attendance. As it was, about twenty members travelling by the morning train from the north arrived at Thirsk a little before eleven o'clock, and straightway took the carriages which were in waiting to save four or five miles of uninteresting turnpike, thereby shortening a somewhat heavy day's walk. Alighting at the end of a bye-road the walk commenced with a short pull uphill to Gormire, a curious little tarn about three-quarters of a mile in circumference, lying in a great hollow underneath Whitestone Cliff. This hollow is probably the result of a huge landslip, perhaps as far back as the glacial period. The lakelet and its banks are of much interest to the botanist as the habitat of *Potamogeton heterophyllus*, *P. prælongus*, *Pilularia globulifera*, and *Lysimachia thyrsiflora*. Some of these, together with other less rare plants, fell into the hands of the party. The adjacent cliff is no less interesting to the geologist, presenting as it does an excellent section of the Oolitic beds capped by a crag of calcareous gritstone. Following a somewhat indefinite and circuitous track to the summit of the ridge a panorama of striking beauty lay around, which has been thus graphically described by one of our most valued members, Mr. J. G. Baker, of Kew—"Immediately beneath are the precipice and the lake, and the steep embankment, covered with thickets of brake and blackthorn, and thickly strewn with fallen piles, confusedly upheaped, of massive and angular rocks. From Boltby Moor southward to Hood Hill, a pleasant, undulated, wooded tract extends; and beyond, the broad central valley is spread out like a map from the Tees southward as far as York, with Thirsk and Ripon marked conspicuously, and the lines of railway easily traceable by the smoke of passing and repassing trains. And beyond stretch the western moors, the huge bulk of Penhill looming in the front to shut in Wensleydale like a barrier, and the higher Great Whernside Peak, on the south of it, for a focus, from which the undulated lines of hill stretch north and south till they are lost to view in misty distance."

Descending the ridge on the further side by the main road the Hambleton training stables were soon reached, and attention was divided for an hour between Lord Faversham's stud and the luncheon which was set out at the adjoining hotel. The road thence, as far as Rievaulx Abbey, though varied and picturesque, presents few objects of note. As to the Abbey itself, one can scarcely admit the possibility of disappointment in the first view, from whatever side it is taken. It would be easy to point to older or to more extensive monastic remains, to ruins less hardly dealt with by the finger of time, and less injured by the sacriligious hand of man, but it would be much less easy to indicate one that so completely satisfies the eye, whether viewed from a distance as part of a varied and lovely landscape, or taken in detail from its own immediate precincts.

This, the earliest Cistercian Abbey in Yorkshire, was founded in 1131 by Walter Espec, baron of Helmsley, who in grief for the death of his only son, vowed "to make Christ the heir to a portion of his lands," and thereupon founded first Kirkham Abbey for the Augustinians, then Rievaulx for the Cistercians, and lastly Wardon, in Bedfordshire,—then became himself a monk in his own Abbey of Rievaulx, died, and was buried there.

The Abbey must be to some extent familiar by photographs, even to those who have not visited it, but were it otherwise, it would be manifestly out of my province to enter into details that could not have been gathered in the short hour we were permitted to linger about its ruins. The building lies nearly north and south, a very unusual arrangement, at any rate in this country, for an ecclesiastical edifice. The nave is entirely gone. The lower portion of the transepts is Norman, the rest, together with the choir, are early English; whilst the triforium has both circular and pointed arches. The carving is unusually rich, and in parts, but little of its beautiful detail is lost. Yet perhaps the most enchanting view of the Abbey is one subsequently obtained from the higher ground of Duncombe Park. The end of the long terrace, in the park commands a magnificent prospect of the valley of the Rye, and viewed thence, the roofless ivy-clad ruin stands as the centre of a perfect landscape. The green meadows and hedgerows skirt the stream and crown the nearer hills, backed in their turn by richly wooded slopes, these again closed in by the rugged crests of higher Ryedale or the purple heather of Easterside Moor. Great indeed must have been the change in this fertile valley since it was chosen for its peculiar suitability to the austere Cistercians as a place "vastæ solitudinis et horroris." Indisposition to leave the spot till the last available moment had sped, entailed the necessity of taking the most direct route across the park to Helmsley.

The party was one of unwonted size for the little village, but admirable provision had been made for the comfort of all by the worthy host and hostess of the "Crown."

After dinner the business of the meeting consisted of the election of one new member. There seemed little disposition for further active exertion, and the company separated for their various resting places at an early hour.

After breakfast the following morning a few members walked up the bed of the stream which runs through the town, in quest of the rare limestone plants for which the locality is famous amongst botanists. It was however too late in the season to encourage the hope of much result, and the chance was further lessened by want of knowledge of the district, and of sufficient time for proper exploration. The larger number preferred to spend the interval before train time in visiting the Castle, which stands half hidden amongst trees just within the park gates:—once the fortress of the houses of De Ros, Manners, and Villiers—besieged by Fairfax after Marston Moor—dismantled by order of Parliament—and by his marriage with Mary Fairfax eventually recovered, with the rest of the estate, by the famous Duke of Buckingham—now, a grim ruin; the lofty fragment of the keep, the half demolished walls on which the work of the besieger rather than the hand of time has told, and the double moat, alone remaining to tell of its strength and importance in middle age history.

The members met again at the railway station. On arriving at Gilling, the Church with its fine old sculptured tombs, caused a slight detour. Thence they wandered by the long, winding, densely wooded avenue to the Castle, the ancient seat of the Fairfax family, externally an uncomely block of building but redeemed, as to the interior, from any charge of common-place, by the noble Elizabethan dining hall. Returning through the village and accepting such a luncheon as the Inn (which was by no means provisioned for a siege) could furnish, the walk lay by field and high road past the Roman Catholic College, and through the straggling village of Ampleforth, to Byland Abbey, a ruin scarcely less old, and not a whit less interesting than Rievaulx, but without the same charm of situation, and, unfortunately, not nearly so well preserved. It stands on a stretch of flat, open ground, sheltered by the Hambleton Hills, and is not, from any point, a prominent feature in the landscape. This is perhaps due to the fact that nothing is left of the higher portion of the building. The Abbey is of unusual length (three hundred and twenty-eight feet), and has a great square-ended chancel; the admixture of styles, Norman and early English, here a circular arch, there a pointed window, is very striking and interesting. Thence 'tis but a short walk to Coxwold, when the hard fare of the morning was forgotten in the good cheer of the Fauconberg Arms. A pilgrimage to the Church to see the fine old monuments to the Earls of Fauconberg, and thence, as was natural, to Shandy Hall, once the dwelling of the village parson, the Rev. Laurence Sterne, and still a pretty spot though tenemented as cottages—a fitting conclusion perhaps to the whole. Joining the train at Coxwold the party turned homewards, with the inward satisfaction the retrospect of a couple of well-spent days affords.

The middle of September in the north country is too late to count upon much success in the search for botanical treasure, and beyond those found at Gormire on the first day, but few plants were met with not common in our more immediate district. It was a matter of regret that, when so near as Helmsley, the party were unable, from want of time, to visit Kirkdale Cavern, classic ground to the geologist from its association with the early researches of Dean Buckland.

The Sixth Field Meeting was held (or rather, I should perhaps say, was *not* held,) at Marsden on the 11th of October. Notwithstanding an abnormally rainy season, the pleasure of the excursions had scarcely ever been marred by rain hitherto, but the heavy downfall and pitiless cold of the day fixed for the biennial gathering at Marsden Rock literally swamped the meeting. I believe some half dozen individuals, in whose hearts duty rather than pleasure predominated, did set out according to the official instructions, and of these, I am told, five (*viz.:* two ladies and three gentlemen) did arrive at Marsden. I was not of the number and I have no report of their proceedings, natural history or other, and, in the absence of evidence to the contrary, I cannot doubt that the afternoon was agreeably and instructively spent.

So much for the out-door summer proceedings.

During the Winter two Evening Meetings have been held in conjunction with the Natural History Society. At the first of these, on the 15th January, a report, to which I must revert presently, was presented by the Committee appointed in July to consider the best means of preserving a record of the remarkable trees of the district; and the following papers were read:—

"*Note on the Museum Collection of British Insects,*" by Mr. Thomas John Bold.

"*Note on the Occurrence of Vanessa Antiopa,*" by Mr. Thomas John Bold.

"*Note on Bones dredged in the Bed of the River Wear in* 1872," by D. Embleton, M.D.

All of them will doubtless appear in our Transactions. Two new members were afterwards elected.

The Second Evening Meeting was held on the 20th of March, when two important contributions to our natural history literature were presented, *viz.:*—the long looked for "*Catalogue of Birds observed in Northumberland and Durham,*" by Mr. John Hancock, and a paper "*On a Collection of Fossils from the Ironstone Shale of Redesdale and Bellingham,*" by Mr. Richard Howse. Seldom has our Club seen a larger or more enthusiastic gathering than that which assembled to hear these papers, and never has their attention been better repaid. They will of course appear in the Transactions, and I can only commend them to the careful perusal of such members as had not the good fortune to hear them read: those who were present will look for them in a printed form with avidity, without any prompting of mine.

During the past year a thick part of the Transactions has been issued, completing the fourth volume of the new series, and the tenth volume in all. It will I think be found to average fairly in general value with those which have gone before, though it may appear to contain an undue proportion of Meteorology, owing partly to the record for two years being accidently thrown into the same number.

This, then, is the tale of our work for the year. How will it compare with similar reports presented in the earlier days of the Club? I fear the excess of historical and legendary allusions over those of Natural History import in the sketches of the Field Meetings, may lead to the idea that the excursion, rather than its scientific results, had become the chief object of the members; and if it be confessed that this is, in some small measure true, the fact must be stated with certain explanatory clauses, referring on the one hand to the nature and extent of the work the Club has already accomplished, and on the other to the great changes which have taken place in its external relations.

Thanks to the labours of Messrs. Alder and Fryer, of Hutton, and Buddle, Bewick and Wingate, Winch, Robertson and Storey, and others, some of whom happily are yet with us and still contributing to science, a great deal was known of the flora and fauna of the two counties before the establishment of the Club in 1846. The systematic purpose and direction imparted to research by its influence shows its result in the extensive series of catalogues and memoirs which have since been published. The more conspicuous objects of field and hedgerow, of wood and stream, of shore-pool or sandy beach, naturally occupied first attention; but original work has by degrees been turned towards classes of plants and animals little studied, or perhaps scarcely known, in any accurate sense, a quarter of a century ago. It cannot be said that the contributions of the members to science have diminished of late, either in number or importance, but the

Club would have existed to little purpose if, after its wanderings for so many years over a limited area, the more prominent natural productions of its beaten paths were not fairly ascertained, and to say that the study of these has in some measure given place to that of less conspicuous objects is but to assert that the advance of science has not passed unheeded.

On the other hand, the naturalist must now travel to much greater distances from our manufacturing centres, than of old, for the objects of his search. Mr. Hancock's lament over the destruction of the favourite haunts of wild birds and sea fowl, may be extended to every other department of Natural History. Where is the botanist now to find the plants that used to grow on Prestwick Car, on Boldon Flats, at Dunston, or even on the South Shore east of Gateshead—or at a hundred other localities within easy walk of Newcastle?

Taking these things into consideration it may fairly be maintained that the Club, notwithstanding some tendency to regard the Field Meetings primarily as pleasant excursions, is following a career of usefulness nearly in the lines projected by its founders. Its material prosperity may not be without danger: the first list of members, that of 1847, contained eighty-seven names; its last, published in 1872, has six hundred and twenty-four; but that during the lapse of a quarter of a century no important change should have been necessary in the mode of conducting its affairs is the best testimony to the judgment of those who ruled its early councils, and the happiest promise for its future.

The coöperation of the Field Club and the Natural History Society has been most harmonious and much to the advantage of both bodies. The development of collections illustrating the local fauna and flora has been recognized from the first as one of our leading objects, and the Museum of the Natural History Society has already been enriched in several departments by the efforts of our members. It was the hope of many that these collections would have been utilized to an extent they never yet have been, and that the systematic study of Natural History would have received an impulse it has not hitherto known amongst us, by the establishment of the College of

Physical Science in Newcastle a year and a half ago. But, owing to insufficiency of funds at the first for the endowment of more than four chairs, Biology in all its phases was crushed out, and we have the anomaly in our midst of a natural science school, in which no Natural History science beyond Geology is taught. Rumours of a better time are astir, and alike for the interests of the studies we affect, and for the credit of the College we may all hope that it is true, that funds are now likely to be forthcoming for the introduction of biological science as a part of the College curriculum.

A subject of considerable importance has been brought under the notice of the Field Club, by a circular received from a sub-committee of the British Association appointed to consider the subject of the organization of local scientific societies. The duty remitted to this Committee was "To consider and report whether any steps can be taken to render scientific organization more complete and effectual," and the circular set forth the ill effects which arise from work of the same sort being prosecuted in different localities without reference to each other. It was suggested that closer relations between such societies might be attained, with corresponding breadth in the results of investigation, by

1. The publication annually, in a collected form, of observations or discussions possessing general interest.

2. By organising a system of coöperation, by personal or written communication, or both.

To this end it was proposed, that delegates from certain selected societies and representatives from others, should meet annually for the discussion of questions relative to combined action, and that the delegates should act as a committee of selection in respect to the papers to be included in the common volume of reports.

At the July Field Meeting this document was read and freely discussed, but the proposals were thought to be so wanting in definition, even in essential particulars (perhaps unavoidably so), that the meeting was not prepared to do more than recognise the general importance of the object. A strong feeling was expressed that whatever scheme was adopted must be one that in no way compromised the individuality or the independence of constituent societies. I was requested to attend a proposed meeting of delegates at Brighton on your behalf, which I had the pleasure of doing in company with Professor Freire-Marreco, one of the Secretaries of the Natural History Society. I confess the result was not altogether satisfactory. The meeting was a large one, and leading members of many of the best known Field Clubs and scientific societies might be recognised amongst those present, but who were there as members of the Committee, who in a representative capacity, who as mere lookers-on, it was impossible to say. Notwithstanding the number of members of the Association interested in the question, so little importance had been attached to the meeting that its hour was made dependant on the time when other business happened to be finished, and thus, crowded out of the programme, everything was hurried and free discussion impracticable. The suggestions thrown out seemed to show a want of appreciation of the conditions under which Field Clubs at least have place in the economy of science. Only one definite proposal was brought forward, that of Col. Lane Fox, which was as follows—"That with the view of uniting the papers of local societies under distinct scientific headings, it is desirable that the local societies should agree upon a classification of subjects, and on a uniform size of volume for their publications; that under the several classes of subjects determined upon, additional copies should be printed by the societies in the same manner that additional copies are now struck off for the use of authors, and that these should be united annually in a single volume for each class of subjects under the auspices of the Association." Under pressure of time the meeting eventually broke up without arriving at any conclusion, and the whole matter stands over for the consideration of a new and somewhat enlarged Committee. The best reply, so far as we are concerned, to Col. Lane Fox's proposal, would be a copy of our balance sheet. The advantage of a largely increased circulation of our papers would be readily acknowledged if the matter came before our Committee, but the reply would be all the same, "We cannot afford it!" The usefulness of associations like this has its very origin in the trifling expense at which they may be worked, and the consequently small subscription necessary. Hence Field Clubs, if ours may be taken as a fair example, cannot coöperate in any scheme which would necessitate the setting aside of part of their funds to supply copies of their papers to a wealthy body like the British Association. At the same time every one must admit that the object is worth making some sacrifice for, and one which well merits the thought and labour Sir Walter Elliot and others are devoting to it.

"What is the duty of the Club in respect to the remarkable trees that at present exist in the district to which its excursions extend?" is a question that has on several occasions been discussed, and one which has been prominently brought under notice by two of its late Presidents. The rapid development of deleterious mining and manufacturing operations in Northumberland and Durham is making havoc of their vegetation, and it is therefore most desirable that trees of interest, either for their size, botanical peculiarities, or historic associations, should without delay be noted and described for the benefit of those who follow us. The subject was formally brought forward at the Longhoughton Meeting in June last, and an influential sub-committee appointed to collect preliminary information. A brief circular was drawn up and widely distributed, and by its means particulars concerning about eighty such trees were obtained. Thus furnished, the sub-committee proceeded to consider the matter in its various bearings, and the conclusions arrived at were embodied in a lengthy report presented at the First Evening Meeting. Their recommendations were approved and unanimously adopted, and the carrying of them out was committed to four members of the old Committee with Mr. Atkinson as Chairman. The report itself is in the hands of all members, so that I need make no lengthy allusion to it. The record is to consist of photographs and letterpress, both of a size to bind with the Transactions. These are to be issued as rapidly and as fully as the funds contributed for the purpose will permit. As the Club treasury will not bear any additional burden without crippling its ordinary publishing resources, members are asked for contributions of five shillings each towards this special object, for which they will receive in return copies of all photographs and letterprèss that are issued. The Committee is ready to begin its more active duty as soon as the trees are in full leaf and the sun smiles approval, and I would urge upon all our members that they should, without delay (for this is important), send in their names to be placed on the subscription-list.

In connection with this subject the Chairman of the Committee, Mr. G. Clayton Atkinson, exhibited at one of our Evening Meetings a simple little instrument he had devised, to replace the pocket sextant for taking the height of trees. It consists of a small right-angle triangle of brass, with a transverse pivot for suspension so placed, that when freely hung, the brass of the triangle is horizontal. The basis for calculation is readily obtained by receding from the tree until the hypothenuse is in a direct line with the topmost branch. This instrument has been dedicated to the Club, and by the kindness of its originator one, made under his direction, has been placed in the hands of the Secretaries for the use of the members.

Looking for a moment beyond the narrow confines of our own Association the year has been in many ways one of activity and promise to naturalists. No department of Natural History has had greater hold on our members than Marine Zoology, and in none has the Club rendered better service to science. We can scarcely therefore have witnessed the departure of the *Challenger* for its long cruise without an enthusiastic wish for the success of its mission. The experience gained on board the *Porcupine* and the *Lightning* in the summers of 1868, 1869, and 1870, in what may now be regarded as experimental voyages leading up to this greater undertaking, has been brought to bear in the fitting out of the new expedition, and its arrangements have been conducted with a forethought and completeness which leave nothing to be desired. Of the men to whom the work is entrusted, no name could have been suggested that could have given greater confidence to naturalists than that of the chief, Professor Wyville Thomson, and he is supported by a staff of able assistants. The *Challenger* set sail from Portsmouth on the 21st December, and the letters from those on board, which have been made public, already show results which promise for the entire success of the venture. It is matter for legitimate congratulation that this great enterprise, the most complete of its sort ever undertaken, should have been entered into by our government in a manner so well calculated to benefit science.

A narrative of the dredging cruises of the *Porcupine* and *Lightning*, by Professor Wyville Thomson, is one of the books of the year, and has appeared opportunely whilst public attention is attracted to the subject. As its title implies, the work is an account of the "Depths of the Sea," and though directed especially to the history and results of these expeditions of 1868–70, it forms an excellent summary of our present knowledge as to the zoological conditions, physical geography, chemistry, and geological relations of the North Atlantic and Mediterranean. It contains perhaps but little that has not been for some time, in one way or other, before scientific men, but in its present form it appeals to a larger circle of readers. It seems to me however, that, as an account of investigations undertaken at public expense, written for those who, without special training, take an intelligent interest in such subjects, the book fails, firstly, in being somewhat too technical, and secondly, in being a great deal too expensive.

If I make passing allusion, *per contra*, to another occurrence of the year, it is not with the view of detracting from the credit due to the government in the matter of the *Challenger*. But it seems to me it would be wrong to pass over entirely without notice circumstances which at the very end of the last session of parliament called forth the indignation, not merely of scientific but of educated men throughout Europe. Owing to the character of its summer meetings the Club had no opportunity of joining in the protest entered into by societies entirely or in part botanical, throughout the country, against the treatment to which Dr. Hooker was subjected from the present First Commissioner of Works. It is too late now to tender to Dr. Hooker that respectful sympathy which we in common with others felt, but it is never too late to deprecate a system which renders such an outrage possible, or to deplore those humiliating references to science and scientific men which, uttered by a minister of the Crown from his place in parliament and uncontradicted by his colleagues, of necessity pass as the expressed opinion of the government. Happily a universal expression of disapproval showed that the sentiments uttered had no reflex in the public mind, and in this fact alone there is some promise of safety for the future.

Professor Wyville Thomson's work has been alluded to as an important contribution to the Natural History literature of the year, and there are at least two other recent English books which may not be passed over, although the extent to which I have already trespassed on your attention warns me that any comment upon them must be of the briefest. It is easy to accommodate oneself to this condition in the case of Mr. Darwin's "Expression of the Emotions in Man and Animals," for it is, like all his books, so full of accurate observation and philosophical deduction, and the various phases presented to the reader are so closely connected that he who is interested in the subject must go to the book itself, as being a far more compact statement of facts and inferences than any worthy criticism could be. Its bearing upon the great principle with which the name of the author is associated is less obvious than that of many of his papers, but it fits in with the rest to give roundness and solidity to the foundation of the edifice which he has raised.

The other book is Dr. Charlton Bastian's "Beginnings of Life"—an addition of two thick volumes to the spontaneous generation controversy. They contain an epitome of the literature of the subject drawn up with more or less fairness, together with an account of the various series of experiments which have been described in papers previously published by the author, supplemented by some new matter. Whatever estimate may be placed upon Dr. Bastian's experiments, every one must admit the diligence and assiduity with which he has devoted himself to his task—whatever the defects of his book a knowledge of its elaborate details is essential to a student of the subject, even though he may be predisposed to regard it in the same light as the bulk of the world received the summing up of the case for "the Claimant."

It is well known to all present here that if a vegetable infusion, say of hay or other such substance be allowed to stand for some days, under favourable conditions, it will be found to contain enormous numbers of minute living organisms, such as have been known hitherto under the general term "infusoria." This experiment varied in numberless ways, and modified to embrace collateral issues, is the groundwork on which the present phases of the controversy rest—the vexed questions being, whence came active life into the infusion? did it originate in infinitely minute germs either existing in the fluid or carried into it from the air? or was it developed spontaneously (*de novo*) without the agency of previously existing beings? It is generally admitted that germs do exist in the air and in aqueous fluids in infinite numbers, and it is also generally admitted that prolonged exposure to a heat of 100° cent. is sufficient to destroy their vitality. Thus it is manifest that to determine any single fact in connection with the subject, the most elaborate precautions are necessary, firstly, to destroy all existing germs, and secondly, to preclude the admission of fresh germs from the external air. I need not enter into details, but I may say, that it is precisely on these points that Dr. Bastian's successive papers leave an unsatisfactory impression on the mind, and hence to myself, and I believe to many others, one series of his experiments in particular has assumed a new significance since its repetition with confirmatory results by so accomplished an observer as Dr. Burdon Sanderson. It may certainly now be accepted as a fact, that an infusion of turnip to which a small particle of cheese has been added, or an infusion of hay, after long boiling in a tube, subsequently hermetically sealed, will within a few days be crowded with those obscure elementary organisms *Bacteria* and *Leptothrix* It is perfectly open to the opponents of abiogenesis to hold that even accepting these results, they only put back the explanation one stage, and that they prove nothing more than that precautions which hitherto have been regarded as sufficient to destroy the germs of such organisms are not so in reality. It may be that we have got to the point at which we must admit some modification in our views as to what constitutes a germ, and it is even possible that germ functions are performed by bodies not recognisable as such by the microscope. One eminent algologist, Dr. Ferdinand Cohn, gives it as his opinion after many years of patient research that sufficient is not yet known of the conditions relating to the life of *Bacteria* to establish an argument in favour of spontaneous generation upon it.

Again it must be borne in mind, that in a case of this sort, admitting the reasonableness of a germ theory, and therefore the primary importance of precautionary measures, negative results have at least an equal value with positive. If two observers, working under the same general conditions, adopt precautions agreed upon for the exclusion of sources of error, it is manifest *pari passu* if their results be different, the one whose precautions have succeeded is the more reliable. These and many others of Dr. Bastian's processes have been repeated by trustworthy manipulators with entirely negative conclusions.

But, after all, if everything Dr. Bastian brings forward in his two volumes were confirmed, he would still only be at the very outset of an enquiry, upon the results of which the practical value of these preliminary researches must depend. Standing as they do his laborious observations are of comparatively little value. Such things as he describes cannot come about without Law. We have in his book no glimmering of explanation, not even an attempt to construct a theory consistent with what he regards as established facts.

There is still a lingering and not unnatural distrust amongst many thoughtful persons if studies such as those to which the two works I have just noticed relate, and, admitting the unphilosophical excesses of some partisans on either side, in the heat of controversy, I am bound to say a word in defence of the studies themselves. Truth has nothing to fear from science. Surely the story of Galileo has still a lesson for us. His theory of the solar system must have been infinitely more repugnant to the views of the zealous divines of his day, must have appeared infinitely more heterodox and unscriptural than those now broached either in Biology or Geology by any but extremest advocates. Let us not throw aside the theory that explains the largest number of ascertained facts, whatever it be, because we fancy that it must interfere with other views on subjects which we hold to be of more importance. Man's theory may or may not represent a final law, but held in a right spirit, even when most imperfect and faulty, may be a stepping-stone to truth.

I cannot do better than conclude with a passage bearing on such matters from the letter of one whose reverential humility was scarcely less remarkable than his rare scientific abilities, the late Professor Faraday. He says, "But though the natural works of God can never by any possibility come in contradiction with the higher things that belong to our future existence, and must with everything concerning Him ever glorify Him, still I do not think it at all necessary to tie the study of the natural sciences and religion together; and in my intercourse with my fellow-creatures, that which is religious and that which is philosophical have ever been two distinct things."

The Field Meetings for 1873 were arranged to be held as follows:—

May	Holywell Dene.
June	Hexham and Dipton.
July (two days)	Whitby.
August	The Tees, near Barnard Castle
September	Crag Lough.
October	Marsden.

The Treasurer's report (see p. 29) was read and adopted.

The following gentlemen were elected officers of the Club for the year 1873–74 :—

PRESIDENT.

Rev. J. E. Leefe, M.A.

VICE-PRESIDENTS.

Thomas J. Bold, Esq.
J. Clephan, Esq.
Joseph Blacklock, Esq.
D. O. Drewitt, Esq.

Ralph Carr Ellison, Esq.
Rev. J. F. Bigge, M.A.
D. Embleton, Esq., M.D.
R. Ingham, Esq.
Sir W. C. Trevelyan, Bart.
T. Sopwith, Esq., F.R.S.
Rowland Burdon, Esq.
Rev. H. B. Tristram, F.R.S.
George Wailes, Esq.
Edward Charlton, Esq., M.D.
Rev. G. C. Abbes, M.A.
Rev. A. M. Norman, M.A.
Rev. J. C. Bruce, LL.D.
Rev. A. Bethune, M.A.
E. J. J. Browell, Esq.
Rev. R. F. Wheeler, M.A.
G. S. Brady, Esq., C.M.Z.S.
G. C. Atkinson, Esq.
H. B. Brady, Esq., F.L.S.

TREASURER.

Robert Y. Green.

SECRETARIES.

Thomas Thompson.
D. P. Morison.

COMMITTEE.

Thomas Atthey.
William Dinning.
Albany Hancock.
John Hancock.
Richard Howse.
William Maling.
A. F. Marreco.
G. H. Philipson, M.D.
Joseph Watson, jun.
W. M. Wake.
E. C. Robson.
John T. Thompson.

AUDITORS.

J. S. Foster.
T. P. Barkas.

The following gentlemen were elected members of the Tyneside Naturalists' Field Club during the year 1872–73:—

At the Anniversary Meeting, 1872:—Messrs. Fras. M. Balfour, Cambridge; David Watson, Washington; Frederick Young, South Shields.

At the First Field Meeting:—Messrs. Thomas Bulman and T. R. Miller, Newcastle; Geo. Brewis and F. Blake, Jesmond; G. B. McQueen and C. R. Greene, Gateshead; J. Gillie, Westoe; W. H. Warden and G. C. Warden, jun., Tynemouth; James Robson, George Scott, and J. W. Lawson, South Shields; W. H. Paris, Sunderland; Robt. Blair, Harton; Chas. Angus, Elswick.

At the Second Field Meeting:—Messrs. George Reid, Robert Dixon, P. Brown, F. S. Crawford, J. M. Winter, Robert Walton, and John Hutton, Newcastle; G. T. France, Felling; William Gillies, Gateshead.

At the Third Field Meeting:—Messrs. Amos Atkinson, John Park, and C. J. Capper, Newcastle; J. C. Lamb, jun., Ryton; John Clark, Featherstone; Thomas Saunders, Bellister Castle; Wm. Hawdon, Sunderland; Revs. Walter Howchin, Morpeth; J. Lowe, Haltwhistle; and Dixon Brown, Unthank.

At the Fourth Field Meeting:—Messrs. Allan Jeffrey, Winlaton; G. W. Pearman, Sunderland; J. E. Robson, Hartlepool; Joseph Fothergill and the Rev. T. Featherstone, Tynemouth.

At the Fifth Field Meeting:—Mr. Edwin Burnup, Newcastle.

At the First Winter Evening Meeting:—Messrs. John Joicey, Newton Hall; and T. M. Favell, North Shields.

At the Second Winter Evening Meeting:—Messrs. Joseph Thompson, Gateshead; and W. M. Hamilton, Newcastle.

THE TREASURER IN ACCOUNT WITH THE TYNESIDE NATURALISTS' FIELD CLUB.

Dr.

1872.	£	s.	d.
To Balance	8	10	8
,, Subscriptions	145	10	0
,, Taylor & Francis, for use of Plates	5	5	0
,, Sale of "Transactions"	2	16	1
,, Natural History Society One Hundred and Fifty Copies, Vol. IV., Part 1,	27	3	0
,, Authors' Papers	2	8	9
,, Natural History Society One Hundred and Fifty Copies, Vol. IV., Part 2,	30	10	6
,, Authors' Papers	4	3	6
,, Balance due Treasurer	2	14	2
	£229	1	8

Cr.

1872.	£	s.	d.
By Commission	6	15	9
,, Postage, &c.	3	14	9
,, Taylor & Francis	16	15	0
,, Tuffen West	9	0	0
,, W. West & Co.	12	0	6
,, Secretaries Expenses	8	10	9
,, Journal	22	14	8
,, Printing "Transactions," J. Bell & Co.,	149	10	3
	£229	1	8

1873, April 17.—Examined with vouchers and found correct,

T. P. BARKAS, Auditor.

I.—*Note on the recent Occurrence in Northumberland and Durham of the Camberwell Beauty Butterfly.*—By Thomas John Bold.

I have often noticed that a wet season, although hurtful to insect life generally, is certain to produce some striking novelty, and the year 1872 has not been an exception to this rule. It will long be remembered by all as one of the wettest years on record, and by collectors as having produced in some plenty that beautiful butterfly the Camberwell Beauty (*Vanessa Antiopa*, Linn.), a species which very few of our entomologists had previously seen alive. Its occurrence in nearly all the counties of the south and eastern portions of England, and in most of those of Scotland, has been recorded in the various periodicals of the day, and by the kindness of Mr. W. Maling I am enabled to give several instances of its having been captured or seen within the district of our Club's labours.

A very fine specimen was taken in Jesmond Dene on the 23rd of August, and (by the generosity of Mr. Henderson) now embellishes the collection of Mr. Maling. This specimen differs from nearly all the examples of *V. Antiopa*, taken in Great Britain, by having the borders of its wings decidedly yellow, and not white, or creamy white; agreeing in fact exactly with Central European types, from which, when placed amongst a series, it can only be distinguished by the difference in setting. This individual was caught about eleven o'clock a.m., and from its sluggish movements had probably been very recently disclosed from the pupa. Its perfect condition shows plainly that it never had flown: crossing the North Sea it certainly never had attempted. I may add that willows grow near to where it was taken, on which plant the caterpillar is said to feed.

Another specimen was taken at Heaton on the same day as the foregoing, and is in the possession of Mr. Matthew Beaumont.

One, in the collection of Mr. Laws, was taken at Stockton-on-Tees, and several others were seen.

One was caught at Annfield Plain, by Mr. Bulman. Two also have occurred at Winlaton.

Of two specimens in the possession of Mr. John Hancock, one is from Walker, but the locality of the other is unknown to me.

One was taken by Mr. W. Dinning at Wylam.

One specimen was taken and another seen near Durham, by Mr. F. Raine, on the 23rd of August. Other specimens were seen on wing on the 24th and 30th of the same month. Two more were afterwards noticed in the city of Durham, and Mr. Raine had a worn female sent to him from Castle Eden Dene.

A specimen was seen at Rothbury, by Mr. J. H. Rowntree, another at Newbiggen-by-the-Sea, by Mrs. Wassermann; and yet another near Warkworth.

All the above mentioned specimens appear to have occurred between the 20th of August and the end of that month, and, with the exception of Mr. Maling's, all have the white bordered wings which are said to characterize British and Scandinavian examples.

Specimens have, I hear, been taken near Alnwick, and further north, but of them I have no particulars.

In the Entomologists' Monthly Magazine for November, 1872, p. 138, Mr. John Sang records the capture of three specimens at Darlington, and one at Barnard Castle. Several more were seen but not taken. He also notices the occurrence of an example at Saltburn, and of three more at Richmond. Dr. White, in that interesting periodical, the "Scottish Naturalist," Vol. II., p. 16, informs us that six specimens have been taken in Berwickshire. So it appears that this beautiful creature had been pretty evenly distributed over Yorkshire,* Durham, Northumberland, and Berwickshire.

Several theories have been advanced to account for the sudden appearance in unusual numbers of this conspicuous insect. Some suppose them to have flown over to us from the Continent, and as the specimens generally are of the northern type, to have come from Scandinavia. But this would be a flight of more than three hundred miles over a stormy sea, a feat which I do not believe

* Several notices have appeared of this species having been taken in other localities in Yorkshire.

any butterfly could perform. I think if such attempts were made the voyagers must soon come to grief, and that we should frequently find their dead bodies washed up by the surf on our coasts. Now, the only instance known to me of the insect in question having been found drowned, is that mentioned by Mr. Wailes in our Club's Transactions, Vol. III., p. 204, of it having frequently been found floating on the river Tees. But it is also stated that all so found had white bordered wings, and had most probably been bred in the vicinity of that river, a locality which has always been noticed as singularly productive of this fine butterfly. Others, wishful to account for the perfect condition of many of the specimens, suppose them to have been bred here from eggs deposited by immigrants, which had previously flown over in limited numbers. Against this theory the same objection may be urged, the distance is too great, even with the help of the most favourable breezes. All collectors know how unwilling insects are to take wing in high winds, and those who frequent the sea-coast must often have seen how quickly such as do so are blown into a watery grave. A far more likely means of passage is presented by shipping, which might easily bring over hybernating individuals in chinks of timber, or in other places; but in that case specimens would occasionally be found on board the ships, and should any have been able to reach the shore, their progeny ought afterwards to be found most numerous in the vicinity of sea-ports, neither of which is the fact. Although I have had many things brought to me from foreign-going ships, I have never heard of an insect like this (which is too conspicuous to escape notice) having been either taken or seen, and instead of being most numerous near the ports of entry, the butterfly is scattered pretty equally over the country.

Such being the case, I think we must abandon the "flown over" theory as untenable, and may safely conclude that all the examples taken are truly native born. The species is one which has always been remarkably sporadic: its near relations the Painted Lady, and Red Admiral, have the same uncertainty in their appearance; one year they are in countless profusion, and perhaps for years afterwards scarcely an individual will be seen.

That nearly every insect, however rare, shall sometime or other occur in profusion, appears to be a law to which all orders of insects are subject, and illustrations of it are constantly taking place. One year a "grand surprise" suddenly rushes into view, perhaps the next a giant Hawk-moth darts upon the scene, to be followed by lesser magnates of the same stamp: whence they have come no man seems able to say. Look again at the destructive species, (white butterflies, many moths, saw-flies, aphides, etc., etc.,) which suddenly appear in countless hosts, and lead men to fear that their progeny may the following year be so numerous as to totally destroy the produce of their fields and gardens. Such a calamity however seldom takes place, their further increase is arrested, and they disappear as quickly and mysteriously as they came. In beetles, too, the same law obtains, and very numerous instances might be cited, but one or two must suffice. Visitors to our local watering places must have noticed occasionally the sudden appearance of swarms of Lady-birds of various kinds. One of these, *Coccinella* 11-*punctata*, not rare generally, will some years appear in such profusion that every stone, brick, or clog of wood lying on the sandy bents will be reddened by congregated hundreds, but where they have come from, and why, is one of those perplexing questions which it is impossible to answer satisfactorily. Two more instances may be mentioned: a small Curculio, called *Sitones grisea*, occurred one year in such numbers on the coast that every sandy hillock seemed to be alive with them; and again, the very pretty *Chrysomela marginata* was in some plenty at the same time and place, but since then, although I looked for them every season for upwards of twenty years, I have never been able to meet with more than single specimens of either.

In conclusion let me state that *Vanessa Antiopa* is an insect that hybernates, and that specimens may probably be seen on wing in the approaching spring. If so, it would be most desirable that they should not be taken, but allowed a chance of depositing eggs; for could the caterpillars, which are large and conspicuous, be found, the problem of nationality would be satisfactorily solved.

[When riding along the road called the "Lime Road," which passes by my house near Hexham, as we approached a gate by the oak wood, near the old Dilston Park wall, I was delighted to see a *Vanessa Antiopa* rise from the road within four or five yards of me, where it had been sunning itself under the stone wall (or upon a stone fallen from the wall probably) in the early morning sunshine. It was a brilliant day, after recent rain or heavy dew, and as it rose and flew gently forward and then over the wall and across a field, I admired his fine white border, which looked very impressive. I have often caught them in Switzerland, and have seen the willows near Domo D'Ossola devoured by thousands of their caterpillars, but of course the perfect insect has the buff or yellow border *there.*

I have a large specimen in my collection caught near Great Ayton, in Yorkshire, some years ago, and my nephew, Thomas Edward Mounsey, caught a fine one in Castle Eden Dene four or five years since. The specimen I saw at Dukes House (in the "Lime Road"), in the first week in September, was the only instance of my meeting with it in England.

I do not know whether it is recorded that my late relation, William Backhouse, found several of them (*V. Antiopa*) dead at high-water mark fifty years ago at the mouth of the Tees: the best specimen is I believe still in his collection, in the possession of his sons, St. John's, Wolsingham.—*Edward Backhouse, Ashburne, Sunderland, January* 18, 1873.]

II.—*Note on the Museum Collection of British Insects.*—By Thomas John Bold.

It was the intention of the founders of the Tyneside Naturalists' Field Club that collections should be formed of all the natural objects found within its district, and that such collections should be placed in the Museum of the Natural History Society. Although one of British insects has always been kept in view (of course to include local species), several causes have prevented its formation. One was the paucity of collectors, and another, the principal one, was the absence of proper receptacles in the Museum where insects could be placed with any reasonable hope of their preservation. Both of those obstacles no longer exist. We have now a local Entomological Society, with a respectable list of members, which under the able presidency of Mr. W. Maling, is actively employed in collecting our native insects, devoting, for the present, most of its attention to Lepidoptera, of which some very good private collections have been formed. And, by the liberality of the Natural History Society, the other obstacle has been removed, and a series of most beautiful drawers provided for the collection of British insects. In this some progress has been made, and in thirteen of the drawers the Coleoptera (beetles) purchased of the late Rev. R. Kirwood, with a few from other sources, have been arranged, and form on the whole a respectable collection; but still very many blank spaces remain for future contributions. Names and spaces have been provided in three drawers for Hemiptera (bugs), and in one drawer for Homoptera (frog-hoppers). In these a sprinkling of the species has been placed, and we may look forward hopefully to more complete collections of them at no distant date. To the Lepidoptera (butterflies and moths) eighteen drawers have been appropriated. The butterflies (thanks to Mr. Maling and other friends,) are well represented, but the moths are sadly deficient in numbers, a great many even of the larger common species being desiderata; whilst the great bulk of small things are totally wanting. To the latter I would most earnestly draw the attention of our collectors. The habits and transformations of nearly all the large species are well known, but there are many hundreds of the small ones whose "life histories" are yet to be written. Now, these small creatures are certainly the most interesting of their class; amongst them are found some of our most persistent and destructive pests; they blight our fruit trees in spring, they devour our stores of grain and seeds, they eat our clothes, our blankets, our carpets, our sofas, and our collections of natural history; indeed scarcely anything escapes their devouring maws. And the smallest of those small things are perhaps the most wonderful of all, most of them being less bulky than the common house fly. They are however very numerous, both in species and individuals, and are long winged graceful creatures, chastely coloured, mapped out in elegant and curious designs, and often gilded with gorgeous metallic scales. Their economy, too, is most varied, curious, and full of interest. Many are miners, and pass their caterpillar state between the upper and lower surface of leaves, in tiny shoots, in the leaves and stems of various grasses, etc., nearly every plant, shrub, or tree having its peculiar species. Others are wise in their own generation, and make themselves coverings of various materials. These are called "case bearers," as they fabricate cases which cover their whole bodies, and which they always carry about with them. Some of these are formed of wool or of feathers, but the greater number are made of the leaves on which the larvæ feed. These are clipped into form by the worker's jaws, and the seams fastened with silk. In these they travel about, gnawing holes in the cuticle of leaves, so that they may feed upon the pulp, which they extract as far around each hole as they can reach without leaving their dwelling, thus causing those white blotches so commonly seen on wild roses and other plants. Not a few live in leaves, which they roll up and fasten with silk, the ends being left open so that they can feed or leave at pleasure. It is amusing to see how quickly some of them bolt out of one end of the roll when disturbed at the other; but however quickly they may do so they appear always to find time for spinning a silken cord, at the end of which they hang until the danger is past, when they quickly regain their shelter by climbing up it. Greatly varied are the habits of others of these tiny things, but enough has been said to show that they are capable of forming an endless source of amusement and instruction. There are also in the Museum a few Hymenoptera, Orthoptera, and Diptera, but too few to be arranged: we must therefore leave them to the good times yet to come.

From the foregoing it will be seen that only a beginning has been made, and that we have pressing need of assistance to complete the collections. Incomplete collections, like bad lexicons, are of very little use, and I most earnestly appeal for aid to all naturalists (whether members of our Club or otherwise) who feel an interest in the progress of science. In the present "race for education" we must look forward to a great increase of students. Natural History is being more and more taught in our schools, and no doubt many of the young ideas will shoot towards Entomology. Nothing encourages beginners so much as their being able to name their captures with facility, and this they can do most easily by comparing their specimens with those of a typical collection. Books seem to be written more for the advanced naturalists than for the young ones. Full and well arranged collections, being central and easily accessible, would also be of great use to all, as no single collection can be expected to become so complete as one filled by the united efforts of many workers. There is also another view of the question which must not be lost sight of. All classes admire Lepidoptera; admiration often leads to inquiry, and inquiry will show that Natural History is something more than an array of unmeaning names.

Contributions, if left with Mr. Wright, at the Museum, will be thankfully acknowledged, and placed in the collections in the donor's name. It will also afford me great pleasure if I can assist any one to names for such species as they may have doubt about, especially in Coleoptera and Hemiptera.

III.—*Note on the Occurrence of Lepidoptera in Northumberland and Durham in* 1872. By Thomas John Bold.

Favoured by the notes of our colleague, Mr. W. Maling, I again have the honour of laying before the Societies a record of the occurrence of local Lepidoptera during the past season. The year 1872 will be long remembered in this district as one of a most ungenial nature; the spring and summer were cold and wet throughout, except a few days in July and August, and even these were disturbed by storms of thunder and lightning. Under such unfavourable circumstances collectors of Lepidoptera laboured at great disadvantage, and we cannot be surprised to find them complaining of the season being one of the most unproductive in their remembrance. Not only were most of the species few in the number of individuals, which were worn and battered by the elements, but several of them appeared to be actually smaller in size than usual, as if their growth had been retarded by the unusual cold and moisture. But as even a bad season has its bright side, this has produced a handsome butterfly (*Vanessa Antiopa*) in great abundance. A beautiful Hawk-moth (*Smerinthus ocellatus*) has been added to our limited list of Sphingidæ; one Geometer (*Scotosia dubitata*); a Pyralis (*Spilodes paloalis*); and two Tortrices (*Dicrorampha herbosana*, and *Cachocroa grandævana*): the two last are not only new to our fauna, but also to that of Great Britain. Nor must we forget the nearly total absence of destructive insects: neither gardeners nor farmers complain much of damage from "blight," wasps, or from caterpillars, saw-fly larvæ, surface-grubs, or wire-worm; whilst those great destroyers of agricultural produce, the "turnip-fly" and aphides, were nearly totally wanting.

DIURNI (BUTTERFLIES).

The Whites (*Pieris brassicæ*, *napi*, and *rapæ*) were in very small numbers indeed, much to the gratification of cabbage growers.

The Orange Tip (*Anthocaris cardamines*) was rarely seen.

The Frittillaries (*Argynnis euphrosyne* and *selene*). Both species in much smaller numbers than in the previous year.

The Small Tortoise Shell (*Vanessa urtica*) was seen on wing near Hexham on the 5th of February, but very few were seen afterwards.

The Peacock (*V. Io.*) was not seen. *The Red Admiral* (*V. Atalanta*), and *Painted Lady* (*V. Cardui*), were both very scarce.

The Camberwell Beauty (*V. Antiopa*) occurred in some plenty, and a note thereon was communicated to our Societies, at an Evening Meeting in January, by the present writer; to the note it may be added that several hybernating individuals have been found, in different localities, during the autumn and winter.

The Gate Keeper (*Satyrus Tithonus*), *Meadow Brown* (*S. janira*), *Small Heath* (*Cœnonymphia pamphillus*), and the *Common Blue* (*Lycæna Alexis*) appeared much about the usual time of each, and in moderate abundance.

The Lilac Blue (*L. argiolus*) was observed sparingly on wing at Gibside on May the 2nd.

NOCTURNI (MOTHS).

The Death's Head Hawk-moth (*Acherontia atropos*). One specimen only is known to have been caught during the year in our district, and is now in the possession of a gentleman at Blaydon.

The Eyed Hawk-moth (*Smerinthus ocellatus*). A specimen of this handsome insect, which is new to our fauna, was captured by Mr. Norvell, in July, in a foundry at Swalwell, to which it had no doubt been attracted by the light. It appears to be a common species in the south of England, but to become much rarer as it approaches the north. The larva feeds on willow, poplar, apple, etc.

The Poplar Hawk-moth (*S. populi*). The larvæ observed in their usual plenty, on willows and poplars, in the vicinity of Newcastle.

The Small Elephant Hawk-moth (*Chærocampo Porcellus*). None of the perfect insects have this year been taken or seen, but Mr. John Hancock found a caterpillar on the coast at Newbiggen-by-the-Sea.

The Humming Bird Hawk-moth (*Macroglossa stellatarum*). Only one specimen taken, and no larva seen.

Sesia bembeciformis. Alas, our grand nursery for this fine insect has been utterly destroyed; the ground has been sold for building sites, the poplar trees felled and carried away, and the "brethren of the net" left lamenting over the havoc!

Lithosia quadra. Of this very local species three examples have occurred: one was taken in the Grove, near Summerhill Terrace, by Mr. Wasserman, a second on the Town Moor in June, and the other near the Railway Station at Swalwell.

GEOMETRÆ.

Phigalia pilosaria and *Hylemia leucophearia.* Both taken at Gibside, in abundance, by Mr. Hedworth, on February 17th; and he noticed a great many males of the former dead and floating on the surface of a pond near the monument.

Coremia munitata, *Melanthia ocellata*, and *Phibalapteryx lapidata*, have occurred at Newbiggen-by-the-Sea in July and August, but very sparingly.

Scotosia dubitata. Of this species, which is new to the district, one specimen was taken in the last mentioned locality by Mr. Maling, and another near South Shields by Mr. Eales.

Eupithecia nanata has been taken on the sea banks at South Shields by Mr. Eales, and in a similar locality at Newbiggen-by-the-Sea by Mr. Maling; a curious locality for a heath-feeding insect.

Lobophora veretata, a very rare insect, was taken at rest on the trunk of an oak, by Mr. Hedworth, on May 19th, at Gibside.

Amphydasis betularia, another rarity, occurred at the same time and place.

Ypsipetes ruberata, a local species, was taken at Dunston, by Mr. Hedworth, on May 24th.

NOCTUÆ.

Leucania littoralis, *Mamestra albicolon*, *Thyatira derasi*, *T. batis*, *Apamea unanimis*, *Tæniocampa gracilis*, *Caradrina morpheus*, and *Heliothis marginata.* All species, far from being universally common, have been taken, but very sparingly, and several of the specimens are notably small in size.

Nonagria elymi. Mr. Wasserman took about thirty specimens of this hitherto very rare species, near South Shields, in July.

Plusia gamma. Mr. Eales has bred a most remarkable variety so unlike the type, that it might easily pass for another species.

PYRALIDES.

Botys verticalis. Mr. Maling found this species in plenty at Newbiggen-by-the-Sea, amongst stinging nettles, in July.

Spilodes palealis. Mr. Maling was much gratified by capturing a specimen of this very rare moth in the above locality, and at the same time. Previously it has only, I think, occurred at Folkstone, in Kent. Of course it is new to us.

S. sticticalis. Same time and place, occurring singly, as is usual with this species.

Scoparia cratægalis, S. lineolasis, Stenopteryx hybridalis, and *Herbula cespitalis* were all taken at Cresswell in August; the two last in profusion.

CRAMBITES.

Crambus Warringtonellus. In plenty at Newbiggen-by-the-Sea in July.

Homœosoma nombella and *Ephestia elutella.* Same place and time, but more sparingly.

TORTRICES.

Cacochroa grandævana. New to the British fauna. Taken on the ballast heaps at South Shields, in July, by Mr. Eales, and determined by Mr. C. G. Barrett, Norwich.

Penthina prælongana, Stigmonola lutulana, and *Argyrolepia cnicana.* All uncommon species; are from Thornley and Chopwell Woods.

Dicorampha herbosana. Mr. Barrett, Ent. Mon. Mag., IX., p. 27, records the capture, on grassy slopes, near Darlington, of this species, by Mr. J. Sang. It is new to the British lists.

TINEÆ.

Depressaria alshallmeriella, applanella, nœnosella, badiella, and *heracluella* were all common towards the end of the season, but generally this family was very poorly represented.

Gelechia fumatella. Mr. Maling took about thirty specimens of this very local species in July at Newbiggen-by-the-Sea. Commoner species of the genus were moderately abundant.

PTEROPHORI.

Pterophorus ochrodactylus. This pretty "Plume" was plentiful on flowers of tansy, at dusk, in Jesmond Dene, at the end of August.

P. acanthodactylus. Amongst rest-harrow on the coast, at Newbiggen-by-the-Sea in July.

IV.—*Note on Bones dredged from the Bed of the River Wear in* 1872. By D. Embleton, M.D.

Requested by Mr. G. S. Brady to inspect a quantity of bones and horns dredged from the bed of the river above Sunderland, by the River Wear Commissioners during the last twelve months, I went down on the 17th January, 1873, and in company with Mr. Brady, visited the offices of the Commissioners, where the bones had been deposited.

There were in all about twenty-five specimens, of brown colour, and well preserved. They were probably only a part of what had been brought up from time to time by the dredger from a depth of from fifteen to twenty feet below the ordinary level of the river bed at the entrance of Hylton Dene.

There were two imperfect human crania wanting the lower jaws; the frontal half of one was absent, the other had the calvarium pretty perfect above. The latter was that of a young adult, about twenty-five years of age; the former, of which the lower part of the occiput was small, had belonged to a person beyond the middle age. There was nothing else remarkable as to the size or shape of these crania.

Two crania, wanting the lower jaw, of a rather small dog, with large spaces for the temporal muscles; the molar teeth of one had lost fragments of their enamel, perhaps during the gnawing of hard bones: those of the other were perfect.

One cranium of an old goat, the cores of the horns entire, the muscular impressions strongly marked.

Four imperfect crania of the Red Deer (two of the hind, and two of the stag)—one of these was large and strong, and had the right antler truncated, attached to the skull, but not very firmly; the other was absent, and it was thus evident that the animal had come by his death near about the time of the shedding of the horns—the spring of the year.

Several horns, more or less imperfect, of the Red Deer. One imperfect cranium seemed to be that of a Boar. Three imperfect and probably young crania of the *Bos longifrons*, the top and front of the crania broad, the cores of the horns short, being about three inches long, and not strong.

One remarkable and considerable fragment of the cranium, with the almost entire core of the left horn, and the root of the right, was distinguishable from the rest by its large proportions, both of the cranium and of the core of the horn, which must have belonged to an adult *Bos longifrons*, if the fragment be really ancient, which seems very probable, from its having the same general appearance as the rest of the bones, and from the depth at which it had lain. The distance from base to base of the cores across the top of the forehead was seven inches and a half. The length of the left core round the greater or outer curve was twenty-seven inches and a half, and its circumference at the base twelve inches and three-quarters.

There was a front tarsal bone of the *B. longifrons* and a hinder tarsal bone of the Red Deer; also a vertebra of a large whale.

The collection is to be deposited in the Sunderland Museum, where is to be seen a canoe, made of the hollowed-out trunk of a tree, also dredged from the bed of the Wear, and several human skulls from the same part of the river, which were described some years ago in the Transactions of the Field Club by the late Dr. F. H. Johnson.

[In addition to these animal remains some portions of large trees have also been taken from the same position in the bed of the Wear. One of these, which is now lying near the South Dock entrance, at Sunderland, I have measured, and find the dimensions to be approximately as follows. The fragment which seems to be an almost entire trunk from its base to the origin of the branches, is thirty-six feet in length: at a distance of thirty feet from the base its girth is fifteen feet and a half, and the diameter at the base, where the spread of the roots is about to commence, is five feet and a half. The tree appears to be an oak.—*G. S. Brady.*]

V.—*Meteorological Report for* 1872. Edited by the Rev. R. F. Wheeler, M.A., and the Rev. R. E. Hooppell, LL.D.

The editors have again to thank the many friends who so kindly and laboriously from day to day make the countless observations which it is their privilege to reduce and sum up. They deeply regret that the straitened funds of the Club have this year made it a matter of absolute necessity very greatly to curtail the Report on Meteorology. This has compelled them, very much against their will, to omit many observations of interest and importance, and to give up some summaries of their own on the many interesting and exceptional features which the Meteorology of 1872 presents.

NOTES ON THE MONTH.

January.—

Now blustering Boreas sends out of his quiver
Arrows of snow and hail which makes men shiver.
—*Poor Robin.*

Greenwich.—The warm weather which set in on December the 13th, 1871, following the previous period of unprecedented cold, continued with very few and slight exceptions until March 18th.

The mean temperature of January was 41·3°, being 5° higher than the average of 101 years. Since 1771 there have been nine Januaries of somewhat higher temperature. That of 1796 was 45·3°; 1804, 43·2; 1834, 44·4; 1846, 43·7°; 1851, 42·9°; 1852, 42·0°; 1853, 42·4°; 1863, 41·8°; 1866, 42·6°.

The range of the barometer was 1·8 inches. The minimum reading on the 24th, 28·21 inches, is lower than any since 1843, January the 13th, when it was 28·096 inches, and on December the 24th, 1821, 27·89 inches.

North Sunderland.—A wretchedly dull damp month, very great variations in the barometer with extraordinary depressions on the 18th and 24th. Very strong gale on the 8th.

Rothbury.—Thermometer lowest on the 10th and highest on the 30th and 31st—52°.

Wallington.—The year began with a strong gale of wind from the S.E., with rain, snow, and hail. Rain fell on seventeen days, and snow on four days. From the 8th the weather was open but dull, with considerable rain to the end of the month.

Meldon, near Morpeth.—This has been a remarkably mild month. The lowest minimum temperature was 24° on the 21st, and the highest was 54° on the 31st.

The first thrush was heard to sing on the 18th, twenty-eight days earlier than last year.

Wylam.—A changeable month. The fluctuations of the barometer singularly frequent and abrupt; and twice at distant intervals the mercury fell below 28·500 inches. The mean temperature of the month was 2·98° above that of the preceding sixteen Januaries.

Blackbirds, thrushes, and robins in full song nearly daily.

February.—

> On Candlemas day, if the thorns hang a drop (icicle),
> Then you are sure of a good pea crop.
>
> *Old Proverb.*

Greenwich.—The mean temperature of February was 44·8°, being 6·3° higher than the average of 101 years. The instances, back to 1871, in which the mean temperature of February exceeded 44° are as follows: 1779, 45·3°; 1792, 44·7°; 1809, 44·1°; 1850, 44·7°; 1867, 44·7°; 1869, 45·3°. The daily range of temperature was greater than the average.

The mean temperature of January and February was 43·5°, which has only been exceeded twice in the previous 100 years, viz., in 1846, 43·80°; and 1869, 43·20°.

The changes in the barometer were small, the absolute range being only seven-tenths of an inch.

The fall of rain was 0·08 inch in defect.

North Sunderland.—Very little sun or wind. Constant fog and moist. Farmers unable to work their land from its wetness.

Wallington.—The weather was open, dull, and wet. The only snowstorm was on the 16th.

Rothbury.—Grand display of aurora borealis on the 4th. Thermometer lowest on the 8th, and highest on the 1st and 29th.

Meldon, near Morpeth.—A foggy month, with rain on twenty-three days. From the long continuance of dull weather the farmers have had great difficulty in getting their turnips off the tillage land.

On the 6th a beautiful aurora borealis was seen, and on the 17th and 26th lunar halos were seen. A rainbow seen on the 21st.

Wylam.—On the 4th, from 6 till 8 P.M., there was a very fine display of aurora borealis, extending over the south half of the sky, from N.E. to S.W., and coming to an apex a little south of the zenith. At 7½ P.M. the streams of light were very solid, and blood red. This display was seen on the same day in North America, but commenced there at 11 P.M., and lasted till nearly day-break.

The month was remarkably fine and mild, without any snow.

South wind was very prevalent, eleven out of thirty-three records of the wind having been from that point. Barometer and thermometer both very steady.

March.—

> Worse than the sun in March,
> This praise doth nourish agues.
>
> —*Old Proverb.*

Greenwich.—The mean temperature of March was 44·6°, being 3·7° higher than the average of 101 years. The value was exceeded in the following years: 1779, 47°; 1780, 49·2°; 1815, 45°; 1822, 47·3°; 1830, 45·8°; 1841, 46·2°; 1842, 44·9°; 1859, 46·4°; 1871, 44·9°. The daily range of temperature was greater than the average. The range of reading of the barometer during March amounted to one inch.

The fall of rain was 0·5 inch in excess of the average.

The mean temperature of the first three months of 1872 was 43·0°, and this was only equalled once before in 100 years in 1846, 43·6°, and never exceeded.

North Sunderland.—The month was mild dull and damp to the 14th. After that continued bad weather, ending in a storm of snow and rain.

Wallington.—The weather from the 1st to the 10th was fine and the rainfall light: from the 11th to the end of the month rain fell nearly every day, accompanied with cold northerly wind for the most part; and on nine nights frost was registered. The low temperature during March retarded vegetation considerably.

Rothbury.—Thermometer lowest on the 26th, and highest on the 4th and 5th.

Meldon, near Morpeth.—From the 2nd to the 11th the weather was mild and dull, and from the latter date up to the 18th it was wet, and on the 19th snow came and there were frequent falls to the 27th. From the 27th to the 4th of April rain fell on every day, which retarded the cultivation of the soil, and strong lands were in a very wet condition.

Wylam.—A fine mild month till the 20th, when the temperature began to fall; and from that time we had snow daily till the 29th, with cold N.E. winds.

Gainford.—Very strong fresh in the Tees on the 29th. The river was more full of water than it had been known to to be for some years.

April.—

> Betwixt April and May if there be rain,
> 'Tis worth more than oxen and wain.
>
> —*Old Saying.*

Greenwich.—The mean temperature of April was 48·3°, being 2·3° higher thdn the average of 101 years. The daily range was greater than the average.

The weather from the end of March until the first week in May was very changeable, a few days of warmth and then a few days of cold—the warm days preponderating.

The absolute range of the barometer was 1·4 inches.

The fall of rain was 0·7 inch in defect of the average.

North Sunderland.—The latter part of the month was cold and very stormy.

Rothbury.—Thermometer lowest on the 5th; highest on the 12th. Heavy gale from the N.E. on the 23rd with much rain.

Wallington.—The month opened with rain and snow. From the 5th to the 16th the weather was fine and fair, and favourable to the growth of plums, pears, cherries, and other fruits. On the 17th a change took place, severe cold N.E. winds prevailed with snow and hail to the 28th. There was consequently much destruction of fruit.

Meldon, near Morpeth.—From the 4th to the 17th the weather was dry, but on the latter date rain came and continued either to rain or snow for twelve days in succession. On the 21st 1·31 inches of rain fell, and on sixteen days either rain or snow fell.

Wylam.—A fine cool month.

May.—

Mist in May, heat in June,
Makes the harvest come right soon.
—*Old Proverb.*

Greenwich.—The mean temperature of May was 50·9°, being 1·7° lower than the average of 101 years. The daily range was less than the average.

The movements of the barometer were numerous but not of great magnitude. The range of reading was one inch.

The fall of rain was 0·9 inch in excess of the average.

North Sunderland.—A few warm days at the beginning and end of the month, otherwise the weather was very cold and ungenial.

Wallington.—The bleak cold weather which characterised May, and the strong N.E. winds which prevailed while the apple, damson, and standard plum trees were in bloom, destroyed the blossoms with but few exceptions. The rain, however, did most damage, by washing off the pollen day after day, and so preventing the fruit setting. The foliage of the trees and bushes was very much blighted and afterwards dried up and fell off.

Meldon, near Morpeth.—From the long continuance of rain the cultivation of the land was a tedious task, and the farmers got little done towards the sowing of their turnips. From April the 17th to May the 31st there were only twelve days on which rain did not fall.

Wylam.—Cold till the 19th, with N.E. winds; after that fine and pleasant.

North Shields.—About 5 P.M. on the 8th two mock suns were visible, one on either side of, and at equal distance from, the sun, while towards the zenith, at apparently the same distance from the sun, there was an inverted arch of very brilliant prismatic colours. The sky was quite clear at the time.

June.—

If on the eighth of June it rain,
It foretels a wet harvest, men sain.
Old Proverb.

Greenwich.—The mean temperature of June was 59·2°, being 1° higher than the average of 101 years. The daily range of temperature was greater than the average.

The range of reading of the barometer was only eight-tenths of an inch.

The fall of rain was 0·3 inch in defect of the average.

North Sunderland.—A great want of sunshine and great electric disturbances marked the last half of this month.

Rothbury.—Thermometer highest on the 16th and 18th. Very heavy thunderstorm from the S.W. on the 18th.

Meldon, near Morpeth.—From the 1st to the 14th there was only one fair day, namely, the 4th. The constant showers of rain were a great hindranee to the cultivation of the soil.

Wallington.—A remarkably fine month, with steady high temperature and frequent showers. All green crops made much growth.

Wylam.—A fine month; barometer unsteady; thermometer rising pretty gradually from a mean temperature of 50° at the beginning, to 70·5° on the 18th, and the gradually falling to 54° at the end of the month. On the 18th we had a thunderstorm, when 0·10 inch of rain fell here; but at Newcastle the thunder and lightning were almost incessant and very near; and the rain which fell from 12¼ till 1 P.M., almost the heaviest I ever saw, at least 1·12 inches being received into the guage of the Literary and Philosophical Society in that town.

Newcastle-on-Tyne.—On the 18th a very heavy thunderstorm passed over the district about mid-day. Very large hail fell in Newcastle, South Shields, and other places. No hail fell at Whitley. The storm extended from Morpeth to Peterborough. Between 1·45 P.M. and 2·30 P.M., 0·52 inch of rain fell at Whitley.

Cullercoats.—Very large takes of salmon were secured. On one day, the 12th, more salmon was brought into Cullercoats than in any week previously known. On the 18th and 25th there were also very heavy takes. (See page 60, last table.)

July.—

> If it rain on the feast of St. Processus and St. Martin it suffocates the corn.
>
> —*Latin Proverb.*

Greenwich.—The mean temperature of July was 65°, being higher than the average of 101 years.

The daily range of temperature was greater than the average. The readings of the barometer were very steady. The range was little more than half an inch. The departures of the mean daily values from the average were small throughout.

The fall of rain was 0·1 inch in defect of the average in July.

North Sunderland.—A moist warm month, but very little sun.

Rothbury.—Thermometer highest on the 21st, 83° in the shade.

Byrness.—On the 29th there was a very heavy thunderstorm, accompanied by very destructive hail. The hail cut down the vegetables, and did great damage in other ways.

Wylam.—A fine month with a good deal of thunder and lightning, the latter in many cases causing death, though not in this immediate neighbourhood. These storms did not change the exceptionally high temperature, which prevailed, till the 28th, when it began to fall. It had been singularly even till that time, as was the atmospheric pressure during the whole month, the extreme range of the barometer being less than half an inch (·455).

The thermometer attained its maximum for the year on the 5th, viz., 86°.

Wallington.—The weather during July was very favourable to vegetation. The temperature was higher than in June. Hay crops remarkably heavy, and mostly secured in good condition. The turnip crops were very abundant.

Meldon, near Morpeth.—The mean temperature of this month is nearly 4° higher than it was in July, 1871. Thunderstorms were very prevalent and violent. The temperature varied very much; the range of the maximum thermometer was from 61° to 90°. The highest maximum temperature was 90° on the 5th, which was the hottest day of the year.

Knaresdale.—In the early part of July a waterspout burst near Slaggyford and did great damage.

Newcastle-on-Tyne.—On the 25th a severe thunderstorm broke over Newcastle and the neighbourhood, doing much damage. The storm extended to quite the southern part of the Island and across the channel to Jersey.

August.—

Dry August and warm, doth harvest no harm.

—*Old Saying.*

The mean temperature of August was 61°, being 0·2° higher than the average of 101 years.

The daily range was greater than the average.

The mean temperature of the air for the three months ending August was 61·7°, being 1·5° higher than the average of 101 years.

The range of the barometer during August was 0·8 inch.

The fall of rain was 0·3 inch in excess of the average.

North Sunderland.—A very dull damp month. The harvest prospects very bad.

Rothbury.—Warmest day on the 16th. Heavy gale and thunderstorm on the 6th.

Wallington.—Owing to wet weather, and a temperature below the average, corn was late and made little progress in ripening in this locality, and in very few places was it ready to be cut at the end of the month.

Rainfall on nineteen days 3·83 inches.

Wylam.—A fine month, with a good deal of rain in heavy showers. Temperature and pressure of atmosphere almost as even as during July.

September.—

September dries up wells or breaks down bridges.

—*Portuguese Proverb.*

Greenwich.—The most remarkable feature of the three months, July, August, September, has been the frequency of thunder-storms, especially from July the 6th–14th, August the 5th–12th, September the 3rd–6th, and 19th–29th. Snow fell in Cumberland unusually early, and harvest operations were delayed.

The mean temperature of September was 57·4°, being 0·9° higher than the average of 101 years.

The daily range was greater than the average.

The mean daily values of the barometer were, with few exceptions, in defect of the average. The range of readings amounted to 0·9 of an inch.

The fall of rain was 1·0 inch in defect of the average.

North Sunderland.—A wet ungenial month, and after the 19th very rough, cold, and stormy. Very great storm on the 25th.

Rothbury.—Warmest day on the 5th, coldest on the 20th. Great flood in the Coquet on the 23rd. It was the heaviest since 1833.

Wallington.—Owing to the continuance of wet weather harvest operations were at a stand or nearly so during the month, and the corn was very much damaged both in the sheaf and standing. The latter, from frequent high gales of cold wind, was much shaken out and laid down. But had the temperature been hotter and the air mild, the damage would have been considerably greater.

The most severe storm of thunder and lightning that occurred in this locality during the year was on the 3rd inst., and began about 7 P.M., and rose to its height between 8 and 10 P.M.

Meldon, near Morpeth.—The weather during September was unfavourable to harvest operations, and much hay remained out in the fields.

Wylam.—Wet, windy, and coarse. The equinoctial gales seemed to commence in a modified form about the 10th, and continued till the 30th, being very violent on the 23rd, 24th, and 25th.

The summer and autumn have presented a great deal of thunder and lightning, with considerable loss of life and property, and the great amount of wet retarded the harvest and injured the corn. Potato disease appeared and destroyed a great amount of food.

It has been a very bad fruit year, in the south of England especially. We have a fair crop of apples and pears on standard trees, and of pears on the cold wall; of apricots (which we usually have in abundance) only a poor crop this year; no doubt the increasing quantity of smoke in the neighbourhood has its share in producing this effect.

October.—

> Think no labour slavery
> That brings in penny saverly.
>
> —*Old Proverb.*

Greenwich.—The mean temperature of October was 47·8°, being 1·8° lower than the average of 101 years, and lower than any year back to 1850, when the value recorded was 47°.

The daily range of temperature was greater than the average by 0·8°.

The departure from the average reading of the barometer was 0·171 inch. The range of readings amounted to more than an inch.

The fall of rain was 1·5 inches in excess of the average.

North Sunderland.—The rainfall was unprecedented, and altogether it was an exceptionally wet and stormy month.

Rothbury.—The highest temperature of the month was recorded on the 1st; the lowest on the 6th. There was a great flood in the Coquet on the 11th.

Wallington.—Much rain fell during October; and on the 10th, between 4 P.M. and 9 A.M. the following morning, 1·67 inches were registered. The Wansbeck overflowed its banks.

Owing to the wet weather the corn still in the fields was much injured and was housed with great difficulty.

Wylam.—A dull unpleasant month, with a great deal of rain; and some wind at the beginning and end of it: the corn considerably injured by it, and the crops not heavy. Potato disease very prevalent, as also foot and mouth disease among cattle and sheep.

Temperature even; atmospheric pressure fluctuating during the month.

North Shields.—The heaviest rainfall of the year occurred on the 10th, when 2·285 inches fell from 3 P.M. on the 10th to 11 A.M. on the 11th.

November.—

> Under the furze is hunger and cold,
> Under the broom is silver and gold.
> —*Old Proverb.*

Greenwich.—The mean temperature of November was 45·3°, being 3° higher than the average of 101 years, and higher than any preceding year to 1863, when it was 45·7°.

The daily range was less than the average by 1·7°.

The range of the readings of the barometer was 1·5 inches.

The fall of rain was 0·6 inch in excess of the average.

North Sunderland.—Must be described as a dull, wet, stormy month. Some large meteors were seen, particularly on the 5th. Quite a meteor shower on the 27th, about 6·30 P.M., but the sky soon clouded over. On the 6th a very great storm; from 3 P.M. a perfect hurricane.

Wallington.—November was excessively wet. From the 10th to the 17th rain fell without ceasing on each day; the Wansbeck was flooded, and caused more damage than any of the former floods of the year.

The frequent high gales of wind broke and split off many large branches of the forest trees. On the 27th, from 6 to 12 P.M., a fine display of meteors was observed northward radiating to the west and east. On the same night a fine aurora borealis was seen.

Meldon, near Morpeth.—A very wet month. On the 15th the rainfall was 1·12 inches. There were violent gales of wind on the 1st, 6th, and 7th. The gale of the 6th was very violent, and totally divested several of the forest trees of their leaves. The lifting of potatoes has been a difficult operation this season on strong lands, and the tubers were very much diseased.

North Shields.—Very strong gale from the S.W., beginning on the 6th and ending at 4 o'clock on the 7th. Much damage done. At Alnwick the self-registering anemometer, belonging to His Grace the Duke of Northumberland, recorded a velocity of seventy-one miles an hour. Much damage was done at various places throughout the counties of Northumberland and Durham. The storm extended over Scotland, and a considerable part of England.

South Shields.—There was a great shower of falling stars on the 27th. The Rev. Dr. Hooppell states that at least thirty thousand may be considered to have been visible between 6 P.M. and 11 P.M. A very considerable fall of temperature followed. The same phenomenon was observed after the great shower of stars in 1866.

December.—

Light Christmas, light wheat sheaf,
Dark Christmas, heavy wheat sheaf.

—*Old Proverb.*

Greenwich.—The mean temperature of December was 42·9°, being 3·8° higher than the average of the preceding 101 years. This was chiefly owing to the high night temperature.

The daily range of temperature was 1·2° above the average.

The range of the readings of the barometer was more than an inch.

It is rarely that such a long period of depression in atmospheric pressure occurs as took place in the last quarter of 1872.

The rainfall was 2·1 inches in excess of the average.

The most remarkable feature of the quarter was the frequency of rain. During the quarter it fell at Greenwich on sixty-seven days, a greater number than had been recorded since 1815. The total fall amounted to 11·32 inches.

North Sunderland.—An open month but very dull, wet, and stormy. Soil completely saturated, and farm work at a standstill.

Rothbury.—The thermometer was lowest on the 5th, 12th, and 13th. Highest on the 26th.

Wallington.—On twenty-three days rain fell this month to the amount of 6·10 inches, and in excess of any of the previous months of the year. The heaviest fall was on the 8th, from 8 P.M to 9 A.M., when 1·23 inches fell, which caused a rapid overflow of the becks and streams, and wrought destruction in many places in the neighbourhood.

During the year thunderstorms have occurred on twenty-nine days, accompanied by lightning on eighteen days, which were destructive to both life and property.

From the 23rd to the 31st the temperature was high, and the year went out fresh, calm, and spring-like.

Whitley.—Very heavy gales visited the neighbourhood on the 17th and 18th. Brig "Consul" wrecked at Tynemouth on the 18th, and several wrecks occurred at Amble, between thirty and forty lives being lost there.

Dinsdale, near Darlington.—During 1872 the rainfall has been excessive. The take of salmon by the net fishermen was better than usual, and far fewer bull trout were seen than ordinarily. On the 26th of August there was a very heavy thunderstorm, whieh damaged several trees, and set fire to some hay. The rainfall was very great, and did much damage to the roads, fields, and gardens.

The crop of wall fruit was an entire failure, but there was a tolerable supply of pears, apples, and gooseberries. Potatoes were quite a failure. The year finished with high winds and rain.

NOTES ON THE RAINFALL OF 1872.

For many years to come 1872 will be remembered as the wettest year on record. The rainfall over the whole of the British Isles, according to Mr. Symons' elaborate returns and tables, being 32 per cent. in excess of the average. At several places in Durham and Northumberland the rainfall of 1872 has been very nearly double that of 1871. The tables will show at a glance the enormous excess in every case. At Durham Observatory it was 95 per cent.; at Deadwater 93 per cent.; and Cragside, Rothbury, 87 per cent.

In accordance with the plan pursued in former years, the subjoined returns are given from Mr. Symons' invaluable yearly report on the rainfall of the United Kingdom.

ENGLAND.

GREATEST.	INCHES.	LEAST.	INCHES.
The Stye, Cumberland	243·98	Silsoe, Bedfordshire	26·18
Little Langdales, Bridgeend, Westmoreland	133·36	Kew Observatory	27·39
Callington Hingston Down..	87·87	Billericay, Essex	28·04

WALES.

GREATEST.	INCHES.	LEAST.	INCHES.
Beddgelert	150·21	Monmouth	43·78

SCOTLAND.

GREATEST.	INCHES.	LEAST.	INCHES.
Bridge of Orchy	143·00	Wick	28·60
Glen Quoich.....................	121·30	Culloden House.................	31·85

IRELAND.

GREATEST.	INCHES.	LEAST.	INCHES.
Glenbehy, Kerry	81·31	Dublin..............................	35·57
Glenville, Cork	62·59	Armagh	39·66

THE TABLES.

The editors have again to express their hearty acknowledgments for the many valuable records of observations placed in their hands. They have analysed them, and embodied the results in comprehensive tables, according to the plan adopted last year. By the kindness of several friends, and especially of Mr. Glaisher, of the Royal Observatory, Greenwich, they have been enabled to render these more complete than before. They have been able also considerably to enlarge the table of Humidity, and to introduce, what was needed to complete the view of the climate of our north-eastern district, a general table of the average monthly amount of Cloud.

The limited space at the disposal of the editors in the present volume renders it necessary to omit all subsidiary tables, and also many interesting Notes on Plants, Birds, Insects, &c. They append, however, a few special tables of considerable value, principally in continuation of similar records embodied in the Reports of former years.

The following particulars from the Observatory, Durham, have been supplied by Mr. J. J. Plummer.

Relative Prevalence of Wind from Different Quarters, at Durham Observatory, 1872.

QUARTERS.	Times noted.	Percentage of whole.	Average Percentage of whole for 5 years.
North	69	9·43	9·37
North-East	58	7·92	9·09
East	61	8·33	7·55
South-East	41	5·60	4·22
South	205	28·01	23·98
South-West	95	12·98	13·96
West	126	17·21	18·51
North-West	61	8·33	10·30
Calm	16	2·19	3·04

In the following, the figures for Alnwick are obtained by taking the mean between the greatest and least velocities, attained by the wind each day, as the mean velocity of the wind for that day. In the case of Durham the figures given are strictly exact.

Mean Velocity of the Wind, in miles per hour, in the several Months of 1872, *at Alnwick Castle, and at Durham University.*

MONTHS.	Alnwick.	Durham.	MONTHS.	Alnwick.	Durham.
January	16·73	13·88	July	9·74	6·31
February	14·05	9·92	August	8·83	6·68
March	12·87	11·15	September	17·18	9·55
April	...	12·64	October	16·02	9·58
May	...	9·64	November	18·15	...
June	12·81	7·73	December	17·02	...
Mean for Ten Months............ Alnwick, 14·34; Durham, 9·71.					

The following has been kindly furnished by Mr. G. C. Atkinson.

Percentage of Wind, from Different Quarters, at Wylam, in 1872.

QUARTERS.	Percentage.	QUARTERS.	Percentage.
North	5	South	7
North-East	16	South-West	15
East	5	West	35
South-East	7	North-West	10

Mean Direction of the Wind, at Wylam, in the several Months of 1872.

MONTHS.	Mean Direction.	MONTHS.	Mean Direction.
January	W. 25° S.	July	W. 4° S.
February	S. 23° W.	August	N. 10° W.
March	W. 2° S.	September..............	W. 9° N.
April	W. 38° N.	October.........	W. 23° N.
May	W. 27° N.	November..............	W. 5° N.
June	W. 13° S.	December	W. 24° S.
Mean for Whole Year....................W. 1° N.			

Mr. T. W. Backhouse, of West Hendon House, Sunderland, has sent the following table. By "Yearly Ratio" is meant the amount of Rain that would have fallen, had the wind continued to blow from the same quarter throughout the year, and the same proportion of rain continued to fall with it. The table consequently shows the comparative precipitation accompanying the wind, as it blows from the several quarters.

Duration, in hours, of Wind, from each Quarter, at Sunderland, in 1872, *with the amount of Rain which fell with each, and the Yearly Ratio of the same.*

QUARTERS.	Hours.	Rain.	Yearly Ratio.
North	540	3·42	55·63
North-East	467	3·50	65·83
East..	551	5·07	80·83
South-East	939	5·76	53·88
South	1095	1·59	12·75
South-West	1398	2·71	17·03
West	1611	1·94	10·58
North-West	616	4·94	70·44
Uncertain	1567	7·93	44·45

Mr. Atkinson, of Gainford, has furnished the Club with interesting particulars respecting the amount of Solar Radiation and Minimum Surface Temperature at that station. These are combined with some results of a similar kind from North Shields, supplied by Mr. R. Spence.

Mean Maximum Reading of Black Bulb Thermometer in vacuo in Sun at Gainford, and Mean Minimum Reading of Black Bulb Thermometer on Grass at Gainford, and of Plain Bulb Thermometer on Grass at North Shields, in the several Months of 1872.

MONTHS.	GAINFORD. In Sun.	GAINFORD. On Grass.	North Shields. On Grass.	MONTHS.	GAINFORD. In Sun.	GAINFORD. On Grass.	North Shields. On Grass.
January......	...	...	25·2	July	116·5	47·9	45·0
February.....	...	...	31·0	August	111·0	45·5	44·0
March.........	...	...	26·8	September...	98·7	40·2	35·0
April	96·5	33·4	31·2	October	75·8	32·3	31·8
May..	104·2	35·0	31·8	November ...	55·2	30·7	31·0
Jnne	116·6	41·8	39·0	December ...	45·0	28·0	24·0

The Club is likewise indebted to C. B. Goldson, Esq., of the Tyne Pier Works, for some very interesting observations, of which the following is a digest:—

Results of Simultaneous Observations of Temperature, in the Air, and at the Bottom of the Sea, at the extremity of Tynemouth Pier, taken twice daily, at High Water, for ten weeks, from June 23rd to Aug. 31*st*, 1872.

WEEK ENDING	Mean Reading in Air.	Mean Reading at Bottom of Sea.	Mean Difference.	Greatest Difference.	Day.	Least Difference.	Day.
29 June	55·4	50·3	5.1	10·5	23	2·0	28
6 July	60·2	51·2	9·0	27·0	4	2·5	3
13 July	55·3	54·3	1·0	10·0	8	1·0	9
20 July	59·9	55·1	4·8	14·0	16	—1·0*	14
27 July	66·0	55·6	10·4	16·0	21	5·0	23,25
3 August	60·9	55·9	5·0	11·0	28	1·0	2
10 August	59·6	56·4	3·2	10·0	4	—1·0*	4
17 August	60·8	56·3	4·5	13·0	17	2·0	15
24 August	59·7	56·1	3·6	10·5	18	1·0	19
31 August	59·0	56·5	2·5	8·0	29	0·0	27
Average	59·7	54·8	4·9				

* On these occasions the temperature of the bottom of the sea was one degree higher than the temperature of the air.

The Club has again to record the extremely valuable help rendered by the following observers, the result of whose work has furnished the material for the foregoing Report.

Alnwick	His Grace the Duke of Northumberland, Alnwick Castle, by Major Holland.
Allenheads	T. Sopwith. Esq., F.R.S.
Brinkburn, Morpeth	C. H. Cadogan, Esq.
Bywell	Mr. John Dawson.
Cresswell	Rev. J. E. Leefe, M.A. Mr. Forsyth.
Darlington, Southend	H. Pease, Esq.
Darlington, Brinkburn Gardens	Mr. Henry Ward.
Deadwater	Mr. Scott.
Dinsdale Rectory, Darlington	Rev. J. W. Smith, M.A.
Durham, Ushaw College	Rev. Dr. Gillow.
Durham Observatory	John J. Plummer, Esq.
Eaglescliffe, near Yarm	Rev. Canon Hull, M.A.
Earsdon	John Taylor, Esq.
Falstone	Mr. N. Hedley.
Gainford	A. Atkinson, Esq.
Gateshead, Eighton Banks	J. M. Favell, Esq.
Glanton Pike	F. W. Collingwood, Esq.
Greenwich	James Glaisher, Esq., F.R.A.S.
Harbottle	Mr. T. Thompson.
Hartlepool	J. Howkins, Esq., C.E.
Haltwhistle, Unthank Hall	Rev. Dixon Brown, M.A.
Hexham, Park End	M. A. Ridley, Esq.
Howick	Earl Grey, K.G., per Mr. F. Moor.
Kieldar	Mr. William Spence.
Lilburn Tower	Mr. John Deas.
London, Camden Square	J. G. Symons, Esq.
Meldon, near Morpeth	Mr. John Finlay.
Millfield, near Wooler	G. A. Grey, Esq.
Newcastle-on-Tyne	Robert Foster, Esq., 30, Rye Hill. G. Lyall, Esq., Lit. & Phil. Society. Mr. W. Neill, Deaf & Dumb Institution.

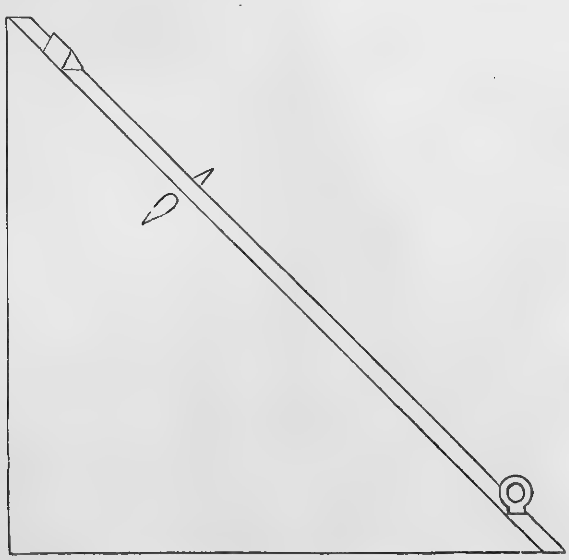
North Shields	John Coppin, Esq. J. R. Procter, Esq. R. Spence, Esq. Mr. Humble, } Post Office. Mr. Irwin, } Post Office.
North Sunderland	Rev. F. R. Simpson, M.A.
Otterburn	Rev. T. Wearing. Burdon Sanderson, Esq.
Riccarton	Rev. W. Smith.
Rothbury	Sir W. G. Armstrong, D.C.L.
Saughtree	Mr. J. J. Bell.
Seaham	Mr. R. Draper, Seaham Hall Gardens. Mr. G. H. Aird, Londonderry Office.
Sedgefield, Durham	Robert Smith, Esq., M.D.
Shotley	Mr. Coulson, Shotley Hall.
South Shields	Rev. R. E. Hooppell, LL.D., F.R.A.S.
Stamfordham	Rev. J. F. Bigge, M.A.
Stanhope	Mr. Surtees.
Sunderland	T. W. Backhouse, Esq., West Hendon House.
Thorpe Grange, Greta Bridge	T. Dodgson, Esq.
Tynemouth	P. J. Messent, Esq., C.E. C. B. Goldson, Esq.
Wallington	Mr. Hedley, Wallington Hall Gardens. Mr. Arthur Dixon.
Wallsend	J. W. Dees, Esq.
Wark	Rev. Hugh Taylor, M.A.
Whitley	Rev. R. F. Wheeler, M.A. Mr. C. Roope, Convalescent Home.
Whittle Dene Company's Reservoirs,	D. D. Main, Esq.
Winlaton	Thomas Thompson, Esq.
Wolsingham (St. John's)	C. J. Backhouse, Esq.
Wolsingham	Amos Mitchell, Esq.
Wylam	G. C. Atkinson, Esq., Wylam Hall.

VI.—*First Instalment of a Catalogue of the more Remarkable Trees of Northumberland and Durham.*

Preliminary to a Catalogue of the Remarkable Trees of Northumberland and Durham, perhaps I may be permitted to describe a little instrument for ascertaining their height, contrived by me in 1872; which, as it can be obtained of Mr. Winter, of Grey Street, or Mr. Robson, of Dean Street, opticians, for a few shillings, will enable members to supply the girth at five feet from ground, the spread of branches, and the height (which latter has been hitherto rather a difficulty,) of remarkable trees within their observation.

The instrument, as at present made, is a right-angled triangle, with two equal sides or edges (three inches each) cut out of brass plate about one-sixteenth of an inch thick; a pin about half an inch long is fixed through the plate at such a point, that when suspended by it between the finger and thumb, and allowed to swing freely, one of the two equal sides or edges of the plate shall be exactly horizontal; the other will then be perpendicular; and the remaining side at an angle of 45° to the horizon.

The mode of using it is to suspend it as above described; and choosing a piece of ground on one side of the tree or other object to be measured, to approach or retire from it, looking along the



ATKINSON'S HYPSOMETER.

sights on the longer side or edge of the triangle towards it until the top of the tree be in an exact line with the sights; mark that place, and measure the distance from it to a point perpendicularly beneath the top (or part of tree of height equal to it); add the height of the eye of the observer from the ground, and the sum is the height of the tree.—*Geo. C. Atkinson.*

CATALOGUE.

The following list has been drawn up by Mr. G. C. Atkinson, at the request of the Committee to whom was entrusted the work of cataloguing and reporting on the remarkable trees of the district. It embraces all the information collected up to the present time, but the Committee hope that many additions may yet be made and published in a future issue.

Excellent photographs of several of the more interesting trees have been taken, and it is hoped that the first prints may be issued to subscribers at no very distant date. The Committee wish especially to invite the attention of members of the Field Club and Natural History Society to the subject, and to ask their assistance both in collecting information, and in subscribing to their publication.

ALNWICK (HULNE ABBEY PARK).

Oak in Filbert Haugh, about 100 yards S.W. from bridge. Girth at a height of 1 foot 6 inches, 14 feet 7 inches: spread of branches, considerable: height, trifling.

Oak (the Trysting Tree) in Wood Closes. Girth at a height of 3 feet, 24 feet 6 inches: spread of branches, inconsiderable: height, 42 feet.

A very remarkable tree, of great age; very hollow, and much decayed, but grand and picturesque.

Mr. Dickson, in his address to the Berwickshire Naturalists' Club, as President in 1857, says of it: "I cannot even guess its age; it must have been a great tree in 1624, as at that time it gave its name to the wood in which it stood, as appears from an old vellum plan of Alnwick Castle (tempore James 1st) as the Trysting Tree Wood. Why called the Trysting Tree I do not know; unless, being half way between the Abbey of the Carmelites at Hulne, and the Premonstratensians of Alnwick Abbey, it may have been their place of meeting."—(*Oct.* 16, 1872, *G. C. Atkinson.*)

Silver Fir, about 50 yards E. of the Lady's Well, and the nearest to it of several very fine Silver Firs. Girth at a height of 5 feet, 13 feet 10 inches: spread of branches, considerable: height, 106 feet.

Silver Fir, about 100 yards E. of Lady's Well. Girth at a a height of 5 feet, 13 feet 10 inches: spread of branches, considerable: not so high as last.

A fine tree sloping to S., but not so fine as last; swells out above the point of girth and divides into three or four heavy upright limbs.—(*Ibid.*)

Silver Fir, third from E. near Lady's Well. Girth at a height of 5 feet, 14 feet 4 inches: spread of branches, considerable: height, 113½ feet.

These Silver Firs are exceedingly handsome, feathering down to the ground in full vigour.—(*Ibid.*)

Scotch Fir, about 100 yards S.E. of Trysting Tree. Girth at a height of 4 feet, 11 feet: spread of branches, 18 yards: height, 60 feet.—(*Ibid.*)

Pinus Douglasii, 20 yards N. of Aln, and 100 yards E. of Lady's Well. Girth at a height of 5 feet, 6 feet 2 inches: spread of branches, 6 yards: height, 98 feet.

About 40 years old. Healthy.—(*Aug.* 30, 1872, *Jos. Snowball.*

Pinus Nordmaniana, 80 yards N.N.W. from Mr. Coxon's (forester's) house. Girth at a height of 5 feet, 3 feet 7 inches: spread of branches, scanty: height, about 70 feet.

A fine healthy tree, more than forty years old.—(*May* 3, 1873, *G. C. Atkinson.*)

Balsam Poplar, 70 yards N.E. of Moor Lodge. Girth at a height of 5 feet, 9 feet 10 inches: spread of branches, 20 yards: height, 81 feet.

A vigorous healthy tree, clean bole for forty feet, then a rough head. About one hundred and twenty or one hundred and thirty years old.—(*May* 3, 1873, *G. C. Atkinson.*)

Larch (the finest in the Park), 120 yards north of Moor Lodge. Girth at a height of 5 feet, 9 feet 3 inches: spread of branches, considerable: height, 102 feet.—(*Ibid.*)

Weymouth Pine on W. of Drive, 100 yards S. of the Duchess' Bridge. Girth at a height of 3 feet, 8 feet: spread of branches, inconsiderable: height, 72 feet.

An ugly tree; rises four feet, then spreads out like an open hand, and rises in separate branches.—(*Ibid.*)

Birch, on S. side of high walk to Lady's Well, and 300 yards W. of Trysting Tree: three stems from one root. Girth at a height of 3 feet: N. stem, 6 feet 4 inches; E. stem, 5 feet 10 inches; W. stem, 5 feet: spread of branches, considerable.

A straggling healthy picturesque tree.—(*Ibid.*)

Hornbeam, 200 yards west of Lady's Well, close to river Aln. Girth at a height of 5 feet, 6 feet: spread of branches, moderate: height, 51 feet.

This tree, which is one of the finest of its kind in the park, was blown down in 1872, and now lies where it fell.—(*Ibid.*)

Birch, 70 or 80 yards S.E. of Hulne Abbey. Girth at a height of 2 feet, 9 feet 3 inches; spread of branches, 18 yards: height, 67 feet.

At three feet the stem divides into two large and rather upright arms.—(*Ibid.*)

Pinus Cembra, the finest in the Park, beside Elyburn Drive, about 500 yards N. of the Home Farm. Girth at a height of 5 feet, 5 feet: spread of branches, considerable: height, 45 feet.

A fine healthy tree, upwards of fifty years old.—(*Ibid.*)

AXWELL PARK.

Mulberry, 50 yards N.W. of House. Girth at a height of 5 feet, about 8 feet: spread of branches, trifling: height, about 15 feet.

Generally bears, and the fruit is used in tarts; in very fine seasons it ripens, and is used at dessert. Bole about three feet, then divides into three spreading limbs about four feet in girth. —(*November* 6, 1872, *G. C. Atkinson.*)

Sycamore, on flat land, 400 yards N.E. of House. Girth at a height of 5 feet, 15 feet 4 inches: spread of branches, 28 yards: height, 65 feet.

A very fine tree, in full vigour. Bole ten feet, and then divides into two main upright stems with a number of side branches.—(*Ibid.*)

Crab, 50 yards S.W. of S.W. corner of Garden. Girth at a height of 5 feet, 8 feet 5 inches: spread of branches, trifling: height, about 20 feet.

Quite hollow and rotten.—(*Ibid.*)

Lime, close on S. of Joiner's Shop, 100 yards S.W. of House. Girth at a height of 5 feet, 13 feet: spread of branches, trifling: height, 101 feet.

A very fine healthy tree, with the singularity of a branch bearing white leaves, growing from its N.E. side about fifty feet up.—(*Ibid.*)

Oak, 200 yards W. of House. Girth at a height of 5 feet, 17 feet: spread of branches, 22 yards: height, 44 feet.

A low singular-looking tree. Bole eight feet; much gnarled. Owes its great girth partly to swollen and contorted excrescences. —(*Ibid.*)

Oak, 400 yards S.W. of House and 100 yards E. of Deer House. Girth at a height of 5 feet, 14 feet 5 inches: spread of branches, 34 yards: height, 59 feet 6 inches.

A splendid tree, and pretty healthy, though all the trees are affected by smoke. Bole nine feet, and then fourteen or fifteen fine limbs rise rather uprightly.—(*Ibid.*)

Oak, in the middle of Well Field, 500 yards W. by S. from

House. Girth at a height of 5 feet, 12 feet 2 inches: spread of branches, 27 yards: height, 56 feet.

An exceedingly handsome, low, spreading tree.—(*July* 27, 1873, *G. C. Atkinson.*)

Beech, 300 yards E. of House. Girth at a height of 5 feet, 13 feet: spread of branches, considerable: height, 55 feet.—(*October* 8, 1872, *G. C. Atkinson.*)

Beech, 1 yard W. of Park Wall, 50 yards E. by S. from last. Girth at a height of 5 feet, 13 feet 10 inches: spread of branches, considerable: height, 55 feet.

Decaying.—(*Ibid.*)

Beech, 150 yards S. from first, and 20 yards W. of Park Wall. Girth at a height of 5 feet, 15 feet 5 inches: spread of branches, 28 yards: height, 65 feet.

Bole nine feet, twisted like a huge rope, and then branching. —(*Ibid.*)

Ash, 330 yards N.E. of House, on E. side of Fish Pond. Girth at a height of 5 feet, 13 feet 10 inches: spread of branches, 18 yards: height, 60 feet.—(*Ibid.*)

Alder, on left of footpath, after crossing bridge, on going up by the short way, from Lodge to House, 15 yards W. of Pond, and 275 yards S.E. of House. Girth at a height of 4 feet, 13 feet 10 inches: spread of branches, 15 yards: height, 50 feet.

Branches off at five feet into four good limbs. A fine healthy tree.—(*Ibid.*)

Sycamore, 220 yards S.E. by S. from last. Girth at a height of 5 feet, 13 feet 7 inches: spread of branches, 20 yards: height, 65 feet.

Bole eighteen feet, then branches. A handsome tree.—(*Ibid.*)

BEAUFRONT.

Oak, called "The Chief," 100 yards S.S.E. from House in Park. Girth at a height of 5 feet, 10 feet 8 inches: spread of branches, 26 yards: height, 51 feet.

Bole seven feet, then spreading branches. A low picturesque healthy tree.—(*Nov.* 27, 1872, *G. C. Atkinson.*)

Oak, 400 yards E. of House. Girth at height of 5 feet, 14 feet: spread of branches, trifling.

Very much gnarled and swollen. Dying.—(*Ibid.*)

Elm (Dutch), 600 yards E.S.E. of House. Girth at a height of 5 feet, 12 feet 5 inches: spread of branches, considerable: height, 60 feet.

Fine healthy tree.—(*Ibid.*)

Silver Fir, in Lady's Walk, 440 yards E. by N. from House. Girth at a height of 5 feet, 11 feet: spread of branches, not great: height, 96 feet.

One of several fine Silver Firs of nearly same size.—(*Ibid.*)

Mountain Ash, 220 yards N.W. of House. Girth at a height of 4 feet, 6 feet 3 inches: had a large head.

Fell, from its own weight, in 1871, and lies where it fell; stem ten feet.—(*Ibid.*)

Beech, 100 yards S.W. of House. Girth at a height of 5 feet, 13 feet 3 inches: spread of branches, not great: fine tall tree.—(*Ibid.*)

Ash, 200 yards N.E. of House. Girth at a height of 5 feet, 13 feet 1 inch: spread of branches, not great: height, 90 feet.

Very fine healthy tree.—(*Ibid.*)

Lime (W. of two), 150 yards S.E. of House. Girth at a height of 5 feet, 11 feet 3 inches: spread of branches, 15 yards: height, 72 feet.

Fine tree.—(*Ibid.*)

Hollies. There are a great number in Hollyhill Wood, to N.E. of House, but none very large.

BELFORD.

Ilex, 300 yards E.N.E. from Hall. Girth at a height of 5 feet, 7 feet 5 inches: spread of branches, 12 yards: height, 72 feet.

Two fine trees of this kind stand near each other, but this is the best and most W. Bole twelve feet, then branches. A fine healthy tree.—(*May* 2, 1873, *G. C. Atkinson.*)

Spanish Chestnut, 100 yards S.W. of Hall. Girth at a height of 5 feet, 10 feet 5 inches: spread of branches, 18 yards: height, 87 feet.

A very straight fine tree, in full vigour.—(*Ibid.*)

Birch, in E. end of "Oak Wood." Girth at a height of 5 feet, 6 feet 3 inches: spread of branches, 16 yards: height, 52 feet.

Bole eight feet, then heavy branches.—(*Ibid.*)

Portugal Laurel, on Lawn, 40 yards W. of Hall Girth at a height of 4 inches, 7 feet 3 inches: spread of branches, 13 yards: height, 43 feet.

A splendid shrub, in full vigour. Planted about 1826.—(*Ibid.*)

BELLINGHAM CHURCH YARD.

Yew. Girth at a height of 5 feet, 15 feet 5 inches: spread of branches, 15 yards: height, 25 feet.

Do. Girth at a height of 5 feet, 14 feet 3 inches: spread of branches, 12 yards: height, 30 feet.

Do. Girth at a height of 5 feet, 12 feet 6 inches: spread of branches, 12 yards: height, 30 feet.

Hollow inside; age unknown.

An aged person told J. Pearson he had heard his father say he had got his dinner inside one of the yews in his school days, which must have been one hundred and ten years ago.—(*J. Pearson, bailiff to Mrs. Davidson of Ridley Hall.*

BELLISTER CASTLE.

Sycamore, growing almost out of the rent wall of the old Castle. Girth at a height of 5 feet, 12 feet 10 inches: spread of branches, 30 yards: height of tree, 51 feet.

A very healthy picturesque tree in full vigour.—(*April* 30, 1873, *G. C. Atkinson.*)

BELSAY.

Oak (the finest on the property), about 500 yards S.E. of House.

Girth at a height of 4 feet, 13 feet 2 inches: spread of branches, 20 yards: height, 54 feet.

Bole eight feet, then divides into two main branches. A very handsome tree, but dying at the extremities.—(*August* 8, 1873, *G. C. Atkinson.*)

Ash, on the top of Belsay Craig, 800 yards S. by ¼-E. from House. Girth at a height of 8 feet, 14 feet 7 inches (in 1807, it was 12 feet 1 inch): spread of branches, 22 yards: height, 45 feet.

An old tree; dying fast, the bole having been gnawed by cattle.—(*Ibid*)

Birch, at the S.W. corner of Belsay Craig Plantation. Girth at a height of 1 foot, 8 feet 7 inches: spread of branches, 17 yards: height, not great.

Bole nine feet, then two large branches. Eight feet seven inches, stated above, at one foot from the ground is, however, too great a girth, as the trunk is even there beginning to divide. There are a good many fine Birches about the woods, this being the finest.—(*Ibid.*)

Sycamore, 100 yards S. of Old Castle. Girth at a height of 4 feet, 12 feet 8 inches: spread of branches, 27 yards: height, 50 to 55 feet.

Bole ten feet; then a very fine healthy spreading head.—(*Ibid.*)

Cupressus macrocarpa, in the Quarries near the "Great Arch" in the pleasure grounds. Girth at a height of 5 feet, 2 feet 5 inches: spread of branches, trifling: height, 36 feet.

A handsome tree, in full vigour.—(*Ibid.*)

Walnut, 30 yards S. of Old Castle. Girth as it rises from the ground, 16 feet 1 inch: spread of branches, 29 yards: height, 45 feet.

A splendid old tree. In 1847, a limb eight feet in girth fell from it; two main limbs remain, the S. and largest of which is ten feet ten inches in girth.—(*Ibid.*)

Araucaria imbricata, the best and N.W. of five or six fine ones in the old Garden, 100 yards E. by N. of Old Castle.

Girth at a height of 5 feet, 3 feet 10 inches: spread of branches, trifling: height, 35 feet 4 inches (30 feet 9 inches was its height in 1864).

These are very fine trees; but one or two of them are dying in an unaccountable way.—(*August* 8, 1873, *G. C. Atkinson.*)

TAXODIUM SEMPERVIRENS, 60 or 80 yards N.W. of Old Castle. Girth at a height of 5 feet, 4 feet 4 inches: spread of branches, fair: height, 35 feet 4 inches.

A fine healthy tree, with singularly light, soft, and velvety bark.—(*Ibid.*)

ILEX, 60 yards N.W. of Old Castle. Girth at a height of 5 feet, 5 feet 2 inches: spread of branches, 16 yards: height, 41 feet 6 inches.

Bole eight feet, and then divides into two straggling branches. —(*Ibid.*)

PINUS EXCELSA of Nepal, 60 yards S.W. of House. Girth at a height of 4 feet, 3 feet 2 inches: height, about 35 feet.

Fine vigorous tree.—(*Ibid.*)

MAGNOLIA CORDATA, close to last. Girth at a height of 5 feet, 1 foot 7 inches: spread of branches, considerable: height, about 20 feet.

Bole five feet. Vigorous tree.—(*Ibid.*)

P. DEODARA, 100 yards W. of House. Girth at a height of 5 feet, 3 feet 11 inches: spread of branches, considerable: height, 33 feet, 6 inches.

Bole eight feet. Vigorous tree.—(*Ibid.*)

ABIES DOUGLASII, 150 yards W. of House. Girth at a height of 5 feet, 7 feet 6 inches: spread of branches, 15 yards: height, 52 feet, 6 inches.

Bole twelve feet, and then branches spreading. A fine tree, but perished and unhealthy at top; has not increased in height for twenty years.—(*Ibid.*)

SILVER FIR, in Old Wood, at corner where bridge leads to Old Lime Kilns. Girth at a height of 5 feet, 10 feet 2 inches: spread of branches, 28 yards: height, 86 feet 6 inches.

Fine tree.—(*Ibid.*)

Silver Fir, in the Burn Walk. Girth at a height of 5 feet, 10 feet 8 inches: height, 91 feet.—(*Sir A. E. Monck.*)

BRADLEY HALL, IN PARISH OF RYTON.

Horse Chestnut, 50 yards N.E. of Hall. Girth at a height of 5 feet, 10 feet 6 inches.

A fine healthy tree, not otherwise remarkable.—(*Oct.* 9, 1872, *G. C. Atkinson.*)

Tulip Tree, on Lawn, 100 yards W. of House. Girth at a height of 5 feet, 6 feet 10 inches: spread of branches, 8 yards: height, 64 feet.

Bole, with trifling branches, slightly decreasing in bulk; top high, and then a poor unhealthy head. Decaying rapidly.—(*Feb.* 17, 1873, *ibid.*)

Crab, in hedge, 150 yards N.W. from House. Girth at a height of 5 feet, 6 feet 5 inches: spread of branches, slight: height, 28 feet.

A curious diseased tree, with knotty excrescences on all its branches like small walnuts.—(*March* 28, 1873, *ibid.*)

Deciduous Cypress, about 15 yards from Burn, between it and the House. Girth at a height of 5 feet, 6 feet: spread of branches, slight: height, 62 feet.

Decaying at heart. A rare tree in the North of England.—(*Ibid.*)

Silver Fir, 100 yards S.E. from House. Girth at a height of 5 feet, 8 feet 9 inches: spread of branches, slight: height, 105 feet 6 inches.

A straight, fine healthy tree.—(*Nov.* 5, 1872, *ibid.*)

Oak, 20 yards E. of last. Girth at a height of 5 feet, 12 feet 4 inches: height, about 90 feet.

A fine, long, straight-boled tree.—(*Ibid.*)

Silver Fir, 200 yards E.N.E. from House. Girth at a height of 5 feet, 9 feet 1 inch: spread of branches, slight: height, 105 feet 8 inches.—(*Ibid.*)

BYWELL.

Lime, the most N. and finest of three, 400 yards W.W.N. of Hall. Girth at a height of 5 feet, 11 feet 4 inches.

Fine tall trees.—(*September* 7, 1872, *G. C. Atkinson.*)

Elm, 50 yards W. of St. Peter's Church. Girth at a height of 5 feet, 11 feet 1 inch.—(*Ibid.*)

Oak, called the King of Bywell, 760 yards W. of Stocksfield Station on N. side of road to Riding Mill. Girth at a height of 5 feet, 13 feet 3 inches: spread of branches, large: height, 86 feet.

A fine healthy tree, bole nearly twenty feet high, and then branches rather upright.—(*August* 24, 1872, *Mrs. Dwarris.*)

Ash, 50 yards E. of St. Peter's Church. Girth at a height of 5 feet, 13 feet 9 inches: height, 60 feet.—(*Aug.* 24, 1872, *G. C. Atkinson.*)

Ash, 50 yards N. of Old Castle. Girth at a height of 5 feet, 11 feet 4 inches.—(*Mr. Hall.*)

Ash, on Haugh 400 yards W. of Hall, lately taken down. Girth at a height of 5 feet, 11 feet 6 inches: height, 60 feet.—(*September* 6, 1872, *G. C. Atkinson.*)

Spanish Chestnut, on Lawn, 50 yards N.E. of Hall door. Girth at a height of 5 feet, 12 feet 2 inches: height, 60 feet.

A beautiful picturesque tree.—(*Ibid.*)

Turkish Oak, on Lawn, about 100 yards E. of Hall. Girth at a height of 5 feet, 9 feet 4 inches: height, about 50 feet.—(*Ibid.*)

Mulberry, about 200 yards E.S.E. of Hall. Girth at a height of 4 feet, 7 feet 7 inches.

A ruin; bearing a few berries occasionally.—(*Ibid.*)

Pinus Maritima, on Lawn, 100 yards E.N.E. of Hall door. Girth at a height of 5 feet, 8 feet 11 inches: spread of branches, 11 yards: height, about 60 feet.

Stem rises sixteen or eighteen feet to where some branches have been cut off, then thins and rises till the head begins.—(*Ibid.*)

CALLALY.

Beech, by the road side, near the N. side of Lodge. Girth at a height of 5 feet, 12 feet 7 inches: spread of branches, inconsiderable: height of tree, 70 feet.

Some fine Beeches form an avenue along the Turnpike-road (from Rothbury to Whittingham), on E. of Callaly; all fine healthy trees, but this the finest.—(*April* 24, 1873, *G. C. Atkinson.*)

Ash, 100 yards S. of House. Girth at a height of 5 feet, 12 feet 6 inches: spread of branches, considerable: height, 68 feet 6 inches.

Bole thirteen or fourteen feet, then branches off; forming a fine handsome tree.—(*April* 25, 1873, *ibid.*)

CAPHEATON.

Yew, about 300 yards W. of House. Girth at a height of 5 feet, 7 feet 10 inches: spread of branches, not great: height, 52 feet.

Some fine healthy yews form part of an old avenue, of which this tree is the most W. and finest.—(*April* 21, 1873, *G. C. Atkinson.*)

Silver Fir, S.E. of House. Girth at a height of 5 feet, 11 feet: spread of branches, 17 yards: height, 104 feet.—(*Ibid.*)

Silver Fir, 250 yards N.E. of House. Girth at a height of 5 feet, 12 feet: spread of branches, 18 yards: height, 103 feet.

The W. of two which are very conspicuous from Wallington. There were three, but one fell by lightning ten or fifteen years ago.—(*Ibid.*)

Scotch Fir, close to N.E. corner of Garden. Girth at a height of 5 feet, 8 feet 3 inches: spread of branches, not great: height, 65 feet.—(*Ibid.*)

Elm, 100 yards N.E. of corner of Garden. Girth at a height of 5 feet, 12 feet 2 inches: spread of branches, not great: height, 113 feet.

A healthy tree, but drawn up from being planted among others. —(*April* 21, 1873, *G. C. Atkinson.*)

Flowering Ash (*Fraxinus ornus*), 20 yards S. of Garden. Girth at a height of 5 feet, 5 feet 5 inches: spread of branches, considerable: height, 43 feet.—(*Ibid.*)

Lime, E. tree of a row in the Park. Girth at a height of 5 feet, 10 feet 10 inches: spread of branches, inconsiderable: height, 54 feet.—(*Ibid.*)

CHESTERS.

Yew (the most N. and finest of three or four), 50 yards S. of Garden S. Wall. Girth at a height of 1 foot, 10 feet 4 inches: spread of branches, considerable: height, 36 feet.

A fine tree. Planted about 1771, when the house was built. —(*July* 26, 1873, *G. C. Atkinson.*)

Black Poplar, 50 yards N.E. from House. Girth at a height of 5 feet, 10 feet 4 inches: spread of branches, 18 yards: height, 68 feet.

A healthy ugly tree. Bole twelve feet, then spreading branches. —(*Ibid.*)

CLEADON.

Mountain Ash, 15 yards N. of Fish Pond in Mr. Abbs' grounds. Girth at a height of 5 feet, 5 feet 2 inches: spread of branches, inconsiderable: height, 35 feet.

Stem eight feet high, and then divides into three. Decaying fast.—(*Oct.* 11, 1872, *G. C. Atkinson.*)

CHILLINGHAM PARK.

Elm (English). Girth at a height of 5 feet, 15 feet: spread of branches, 21 yards: height, 50 feet.

About two hundred years old. Top blown off many years ago.—(*Oct.* 23, 1872, *Earl of Tankerville.*)

Silver Fir. Girth at a height of 5 feet, 10 feet 6 inches: height, 100 feet.

Healthy; about one hundred years old.—(*Ibid.*)

Wellingtonia gigantea. Girth at a height of 5 feet, 3 feet 5 inches: spread of branches, 4 yards: height, 57 feet.

Sixteen years old; raised from seed sent from California.—(*October* 23, 1872, *Earl of Tankerville.*)

Wistaria, in Castle Garden, against N. Wall. Spread of branches, 45 yards from E. to W.

A wonderfully spreading and vigorous tree.—(*May* 15, 1873, *G. C. Atkinson.*)

Oak, 100 yards S. of Schoolhouse. Girth at a height of about 4 feet, 20 feet 7 inches: spread of branches, small: height, about 40 feet.

A very flat-stemmed tree, like two round stems grown together. Bole six feet high, six feet diameter from E. to W., and only four feet N. to S.; much gnarled: a monstrosity.—(*Ibid.*)

CLOSE HOUSE, NEAR WYLAM.

Tulip Tree, 100 yards E. of House. Girth at a height of 5 feet, 5 feet: spread of branches, trifling: height of tree, 33 feet.

Bole seven feet. Healthy tree; flowers often.—(*Dec.* 27, 1872, *G. C. Atkinson.*)

Oak, 250 yards S.W. of House. Girth at a height of 5 feet, 12 feet 2 inches: spread of branches, trifling.

Bole twelve feet, and then divides.—(*July* 11, 1873, *ibid.*)

Horse Chestnut, on Lawn, 60 yards W. of House. Girth at a height of 5 feet, 12 feet 2 inches: spread of branches, considerable: height, 53 feet.

A very handsome healthy tree, branches bowing down and sweeping the ground.—(*Ibid.*)

CRESSWELL.

Pinus Pinaster. Girth at a height of 4 feet, 8 feet: spread of branches, 8½ yards.—(*Dec.* 18, 1872, *Rev. J. E. Leefe.*)

Ilex. Girth at a height of 2 feet, 7 feet: spread of branches, 5 yards.—(*Ibid.*)

Arbutus. Girth at a height of 1 foot, 5 feet: spread of branches, 4 yards.—(*Ibid.*)

Balm of Gilead Fir. Girth at a height of 3 feet, 5 feet 9 inches. —(*Ibid.*)

Deodara. Girth at a height of 3 feet, 2 feet 5 inches: spread of branches, 3¼ yards: height, about 30 feet.—(*Dec.* 18, 1872, *Rev. J. E. Leefe.*)

DILSTON.

Ash, High Town. Girth at a height of 5 feet, 12 feet: spread of branches, 20 yards: height, 60 feet.

Probably one hundred and fifty years old.—(*July* 10, 1872, *C. G. Grey.*)

Horse Chestnut. Girth at a height of 5 feet, 12 feet: spread of branches, 17½ yards: height, 58 feet.

Probably 150 years old.—(*Ibid.*)

Norway Spruce, Dilston Park West Haugh. Girth at a height of 5 feet, 7 feet 11 inches: spread of branches, 15 yards: height, 82 feet.

Probably ninety years old. Contained, in 1862, one hundred and six feet; in 1872, one hundred and eighteen feet.

DUNSTON HILL.

Oak, S.E. of House 200 yards. Girth at a height of 5 feet, 12 feet 4 inches: spread of branches, 20 yards: height, 45 feet.

A fine tree; has lost a large limb on S. side lately.—(*Nov.* 4, 1872, *G. C. Atkinson.*

Araucaria, 50 yards S.W. of House. Girth at a height of 5 feet, 2 feet 5 inches: spread of branches, not great: height, 33 feet.

A healthy tree.—(*Ibid.*)

Holly, 50 yards N.E. of House. Girth at a height of 6 inches, 6 feet: spread of branches, not great: height, 24 feet.

A healthy tree; branching out at seven or eight inches from the ground.—(*Ibid.*)

Cherry (*Cerasus vulgaris*), 150 yards N. of House. Girth at a height of 5 feet, 7 feet 6 inches: height, 48 feet.

Fine tree; bears freely.—(*Ibid.*)

ELLINGHAM ESTATE.

Silver Fir. Girth at a height of 5 feet, 12 feet 8 inches.—(*December*, 1872, *Mrs. H. B. Cresswell.*)

ESLINGTON PARK.

Silver Fir, the most W. and finest of a group of nine, 100 yards W.N.W. of E. Lodge. Girth at a height of 5 feet, 13 feet 10 inches: spread of branches, 12 yards: height, 126½ feet.

A fine vigorous tree, as are the other eight. The Ordnance Surveyors placed a T sight on the upper part of it some years since, and disfigured it by cutting away some of the branches to make their mark visible.—(*April* 24, 1873, *G. C. Atkinson.*)

Holly. Some fine ones stand in the Park, paled in to keep the deer from them. Perhaps the finest, stands 140 yards S.W. from Bridge over the Aln to S.W. of House. Girth at a height of 3 feet, 7 feet: spread of branches, fair: height, about 40 feet.

A healthy tree, with considerable head.—(*Ibid.*)

Birch, close on S. bank of Aln 200 yards W.N.W. from E. Lodge. Girth at a height of 4 feet, 7 feet 5 inches: height, 60 feet.

One of three.—(*Ibid.*)

White Poplar, in the "Trap Wood," about 300 yards N.W. by N. from E. Lodge. Girth at a height of 5 feet, 11 feet: spread of branches, 20 yards: height, 116 feet.

A scanty, straggling, ugly tree.—(*Ibid.*)

FALLODEN.

Ilex. Two very fine trees of this kind grew here, but the largest was destroyed in 1865, and the other about 20 years since. Selby figures one of them at p. 298 of his "British Forest Trees," and states its dimensions (in 1842) to be: Girth at a height of 2 feet, 7 feet 4 inches: spread of branches, large: height, 45 feet.

Silver Fir. Girth at a height of 2 feet, 11 feet 9 inches; at 5 feet, 10 feet 9 inches: height, more than 80 feet.

Do. Girth at a height of 2 feet, 12 feet 7 inches.

Both trees near the house, and not far from water.—(*March* 28, 1873, *Right Hon. Sir G. Grey.*)

Mr. Selby also refers to these two trees at p. 481, and states that they were each upwards of 9 feet 8 inches in girth at 2 feet from the ground, and about 80 feet high; but they have grown very much since 1842.

FALLOWFIELD.

Sycamore. Girth at a height of 5 feet, 14 feet 3 inches: spread of branches, 25 yards: height, 54 feet.

Do. Girth at a height of 5 feet, 12 feet 2 inches: spread of branches, 21 yards: height, 54 feet.

Do. Girth at a height of 5 feet, 12 feet: spread of branches, 24 yards: height 65 feet.

The three best of nine very fine ones, in a close E. of stack-yard. Above two hundred years old.—(*October* 15, 1872, *H. Weddle, agent to Sir Edward Blackett, Bart.*)

FELLING HALL, GATESHEAD.

Mulberry, in the middle of a field, on E. of the old residence of the Brandlings, now a public house called "The Mulberry." Girth at a height of 4 feet, 5 feet: spread of branches, trifling: height, 12 feet.

Suffocated by smoke and chemicals; has a branch on the N. side, which is still vigorous. It has not fruited for many years. I asked the maid of the inn if she could tell me its age. She said "No, but they once hanged a monk upon it."—(*November* 18, 1872, *G. C. Atkinson.*)

"James the First in 1605 recommended the cultivation of silk-worms, and offered packets of seeds of the Mulberry to all who would sow them. No doubt this rendered the tree fashionable, as there is scarcely an old-fashioned garden without one. They were introduced into England about 1548."—*Loudon's Arboretum, Vol. III. p.* 1344.

Of course the "old-fashioned gardens" above alluded, to were chiefly south country gardens; but in our district there are at least four which have Mulberry trees apparently of that date, viz.: Felling, Axwell Park, Bywell, and Saltwell Side.

FENHAM.

Cedar (the largest and E. of two), 250 yards E.N.E. from second milestone on Military Road. Girth at a height of 1 foot, 9 feet: spread of branches, inconsiderable: height, 35 feet.

The girth of nine feet is rather too great, as the stem is divided almost from the ground. A healthy tree, though the lower branches are decaying. The W. tree is not nearly so fine.—(*Feb.* 17, 1873, *G. C. Atkinson.*)

GIBSIDE.

Oak, "The King." Girth at a height of 5 feet, 15 feet 6 inches: spread of branches, 27 yards: height, 58 feet.

Healthy; making young wood.—(*Sept.* 4, 1872, *Right Hon. Sir Wm. Hutt.*)

Turkish Oak, by the Carriage-road above the Octagon Pond. Girth at a height of 5 feet, 6 feet 8 inches: height, 62 feet.

Healthy fine tree.—(*Ibid.*)

White Beech, near Entrance Gate. Girth at a height of 5 feet, 11 feet 5 inches: height, 60 feet.

Healthy fine tree.—(*Ibid.*)

Silver Fir, cut down in Jan., 1871. Girth at a height of 5 feet, 10 feet: height, 105 feet.

Decayed at the top.—(*Ibid.*)

GLANTON PIKE.

Araucaria imbricata. Girth at a height of 5 feet, 2 feet 1 inch.—(*Sept.* 20, 1872, *F. J. W. Collingwood.*)

Cedrus Deodara. Girth at a height of 5 feet, 2 feet 7 inches: spread of branches, 6 yards.—(*Ibid.*)

HAMSTERLEY.

Silver Fir, 300 yards E. of House, on side of top walk to Garden, and about 40 feet above level of the Burn. Girth at a height of 5 feet, 12 feet 2 inches: spread of branches, 17 yards: height, 106 feet.

A very handsome tree.—(*April* 9, 1873, *G. C. Atkinson.*)

Spruce Fir, about 335 yards E. of House, on edge of lower walk to Garden, and near the Burn. Girth at a height of 5 feet, 9 feet 8 inches: spread of branches, considerable: height, 87 feet 6 inches.

A curious growing tree.—(*April* 9, 1873, *G. C. Atkinson.*)

Spruce, 100 yards N.E. of House. Girth at a height of 5 feet, 7 feet: spread of branches, trifling: height 99 feet 6 inches.—(*Ibid.*)

Silver Fir, 250 yards E. of House. Girth at a height of 5 feet, 9 feet 9 inches: spread of branches, moderate: height, 88 feet 6 inches.

A fine healthy tree.—(*Ibid.*)

Scotch Fir, 100 yards N.E. of House. Girth at a height of 5 feet, 9 feet 6 inches: spread of branches, trifling: height, 88 feet 6 inches.

Picturesque tree; covered with ivy.—(*Ibid.*)

HARTBURN.

Silver Fir. Two very fine ones stand 4 yards apart (N. and S.), 450 yards N.W. from the old castellated house at N. of Hartburn, and 30 yards N. of river Pont. This one (S.) is the finest. Girth at a height of 5 feet, 11 feet 7 inches: spread of branches, not great: height, 126 feet.

These two fine trees are at a level of fifteen feet above the Pont, very much embedded in wood; a third, but much smaller Silver Fir, grows fifty yards N. of them. They are all in full vigour.—(*May* 9, 1873, *G. C. Atkinson.*)

THE HERMITAGE, HEXHAM.

Beech, on level ground, 80 yards S. of House. Girth at a height of 4 feet, 13 feet 4 inches: spread of branches, considerable: height 47 feet.

One of three very fine low-stemmed full-topped Beeches, standing in a line E. and W. sixty or seventy yards S. of House, fifty yards apart. In full vigour.—(*Nov.* 20, 1872, *G. C. Atkinson.*)

Scotch Fir. Two stand close together, about 100 yards N.E. of the house. Girth of the tallest at a height of 5 feet, 9 feet 3 inches: spread of branches, inconsiderable: height, 60 feet.

Two fine healthy trees. Rather too close to each other.—(*Nov*. 20, 1872, *G. C. Atkinson.*)

Silver Fir, about 300 yards N. from House, in "Wood Walk." Girth at a height of 5 feet, 10 feet 4 inches: spread of branches, inconsiderable: height, 100 feet.

Fine healthy tree.—(*Ibid.*)

Oak, in Sandhill Field, about 400 yards N.E. of House. Girth at a height of 5 feet, 13 feet 1 inch: spread of branches, considerable: height, 50 feet.

A very fine tree, against which the Perthshire Militia used to fire for practice during the long war.—(*Ibid.*)

Spanish Chestnut, about 200 yards E., and on a level with the House. Girth at a height of 5 feet, 12 feet: spread of branches, considerable: height, 50 feet.

A beautiful tree; stem twelve or fourteen feet, and then a healthy head.—(*Ibid.*)

Service Tree, 100 yards S.E. of House. Girth at a height of 5 feet, 7 feet 11 inches: spread of branches, considerable: height, 30 feet.

Has lost some limbs, but is in considerable vigour. Bears abundance of berries. A few years since a flock of Waxwings settled on it, and scarcely ever left it till they had consumed them all.—(*Ibid.*)

Geen Tree, in the plantation, 30 yards W. of Pestlaw Gate. Girth at a height of 5 feet, 10 feet 4 inches: spread of branches, very small: height, about 50 feet.

Lost a large limb lately, and is dying.—(*Ibid.*)

HOLEYN HALL, WYLAM.

Beech, 150 yards N.W. of House (in hedge). Girth at a height of 3 feet, 12 feet 6 inches: spread of branches, 22 yards: height, 54 feet.

Fine healthy tree; bole ten feet.—(*January* 23, 1873, *G. C. Atkinson.*)

LAMBLEY, ON ALSTON LINE.

Oak, "The Queen," on flat land by S. Tyne, 250 yards N.N.W. from Lambley Farm, on N. bank of Blackburn. Girth at a height of 5 feet, 12 feet 3 inches: spread of branches, 30 yards: height, 53 feet.

An exceedingly handsome well-grown rather stunted tree.—(*April* 30, 1873, *G. C. Atkinson.*)

LILBURN TOWER.

Pinus Douglasii. Girth at a height of 5 feet, 7 feet 8 inches: spread of branches, 16½ yards: height, 75 feet.

Planted in 1839; healthy and vigorous; lost its leader four years since.—*Sept.*, 1872, *E. I. Collingwood.*

Wellingtonia gigantea. Girth at a height of 5 feet, 3 feet 9 inches: spread of branches, 4 yards: height, 27¾ feet.

Planted in 1858; robust and healthy.—(*Ibid.*)

Lime. Girth at a height of 5 feet, 9 feet 6 inches: spread of branches, 15 yards: height, 78½ feet.

Handsome tree, in full vigour.—(*Ibid.*)

Pinus Cembra. Girth at a height of 5 feet, 3 feet 9 inches: spread of branches, 7 yards: height, 37 feet.

Healthy tree, planted in 1839.—(*Ibid.*)

LONGHIRST.

Willow, 220 yards S.E. of House. Girth at a height of 5 feet, 12 feet 9 inches: spread of branches, considerable: height, 52 feet.

A fine healthy tree.—(*June* 19, 1873, *G. C. Atkinson.*)

LONGHOUGHTON.

Willow, in Church-yard. Girth at a height of 5 feet, 11 feet 10 inches.

Fine healthy tree.—(*G. C. Atkinson.*)

LORBOTTLE.

Service Tree, 10 yards S.E. of House. Girth at a height of 5 feet, 4 feet 7 inches: spread of branches, 21 yards: height, 32 feet 6 inches.—(*April* 23, 1873, *G. C. Atkinson.*)

MEDOMSLEY.

Ash, about 1200 yards E. by $\frac{1}{4}$-S. from the Hall (laid down as the "Hollow Tree" in Ordnance Survey). Girth at a height of 5 feet, 17 feet 3 inches: spread of branches, trifling: height, 35 feet.

A singular tree; has apparently been pollarded. The bole, about eight feet high, is hollow and full of openings on all sides; a few branches of inconsiderable size grow out from the top of the trunk, and from them and the trunk itself, rise a number of nearly upright branches.—(*July* 31, 1873, *G. C. Atkinson.*)

MINSTERACRES.

Pinus nobilis. Girth at a height of 5 feet, 4 feet 1 inch: height, 49 feet 9 inches.—(*February* 14, 1873, *Henry Silvertop.*)

Wellingtonia gigantea. Girth at a height of 2 feet, 4 feet 7 inches: spread of branches, 5 yards: height, 32 feet 6 inches.

Planted in April, 1857.—(*Ibid*).

Another, almost as large.

P. Douglasii. Height, 32 feet.—(*Ibid.*)

Cryptomeria Lobbii. Girth at a height of 5 feet, 3 feet: height, 24 feet.—(*Ibid.*)

Taxodium sempervirens. Girth at a height of 5 feet, 3 feet: height, 14 feet.—(*Ibid.*)

MITFORD.

Sycamore, on S. bank of Wansbeck, opposite Mitford House, and 700 yards from it. Girth at a height of 5 feet, 15 feet 3 inches: spread of branches, 23 yards: height, 60 feet.

A splendid tree, in full vigour; estimated, in 1863, to contain 456 feet of timber; bole 11 feet high, and then a rather formal head.—(*Oct.* 7, 1872, *G. C. Atkinson.*)

MORPETH.

Willow, just within the Gate to the Offices at the Rectory. Girth at a height of 3 feet, 15 feet 3 inches: spread of branches, not great: height, 30 or 40 feet.

A fine ruin (nothing but a stump being left) of a tree said to have been planted by the Rev. F. Ekyns, who held the living fifty years, and was succeeded by the Hon. and Rev. F. R. Grey, who has held it thirty years; therefore the tree must be about eighty years old. It still throws out a good deal of green from the top of the stump. The bole is about seven feet high.—(*May* 14, 1873, *G. C. Atkinson.*)

Sycamore, in Rectory Garden, 80 yards E. of House. Girth at a height of 3 feet, 13 feet 7 inches: spread of branches, about 18 yards: height, about 55 feet 6 inches.

A very handsome healthy tree.—(*Ibid*).

NETHERWITTON.

Oak, "The King," about 700 yards N. from Village Church and 90 N. from Mill Dam. Girth at a height of 4 feet on E. and 6 feet on W., 12 feet 11 inches: spread of branches, fair: height, 82 feet.

A very handsome tree, with long straight bole for half its height; beginning to decay.—(*May* 8, 1873, *G. C. Atkinson.*)

Oak, "The Queen," 50 yards E.N.E. from "The King," but not so fine a tree. Girth at a height of 5 feet, 10 feet 11 inches: spread of branches, fair: height, 78 feet.

Clean straight bole for about thirty feet; also decaying.—(*Ibid.*)

Scotch Fir (one of four in Old Park Wood), ½-mile S.E. of Church and 50 yards S. of Pont Burn. Girth at a height of 5 feet, 10 feet 5 inches: spread of branches, 16 yards: height, 43 feet.

Bole rises for twenty feet, then a heavy limb on W. side, growing pretty upright, and then some large ones on E. side.—(*Ibid.*)

Sycamore, close on E. side of Mill Race, 50 yards N. of Manufactory. Girth at a height of 5 feet, 16 feet 5 inches: spread of branches, 20 yards: height, 59 feet.

An exceedingly handsome healthy tree; bole six feet, and then divides into wide spreading arms.—(*Ibid.*)

NEWBIGGEN, NEAR HEXHAM.

OAK, in Barn Field. Girth at a height of 5 feet, 11 feet 6 inches: spread of branches, 13 yards: height, 50 feet.

Healthy.—(*Oct.* 24, 1872, *L. W. Atkinson.*)

SCOTCH FIR, near Hall. Girth at a height of 5 feet, 8 feet 5 inches: spread of branches, 4 yards: height, 90 feet.

Healthy.—(*Ibid.*)

LARCH, in Garden House Field. Girth at a height of 5 feet, 9 feet: spread of branches, 9 yards: height, 80 feet.

Healthy.—(*Ibid.*)

NUNWICK.

ELM, in wall of Cottage Garden, opposite the entrance to Nunwick Hall, on W. side of road from Chollerford to Wark. Girth at a height of 5 feet, 15 feet 6 inches: spread of branches, not great: height, 75 feet.

Rather a flat stem; the girth above-named is therefore too great; a fine healthy tree.—*August* 16, 1872, *G. C. Atkinson.*)

BEECH, about 80 yards S.W. of House. Girth at a height of 5 feet, 11 feet 10 inches.

Some fine Beeches grow about Nunwick, of which this is the best.—(*Ibid.*)

PRESTON TOWER.

ASH. Girth at a height of 3 feet, 12 feet.—(*Dec.*, 1872, *Mrs. H. B. Cresswell.*)

SYCAMORE. Girth at a height of 3 feet, 11 feet 8 inches.—(*Ibid.*)

SPANISH CHESTNUT. Girth at a height of 3 feet, 7 feet 8 inches.—(*Ibid.*)

PRUDHOE CASTLE.

ASH, about 5 yards S.E. from Castle-yard Wall and 50 yards E. of Entrance Gate. Girth at a height of 2 feet on N. and 5 feet on S., 15 feet 2 inches: spread of branches, considerable: height, about 60 feet.

Stands on the very steep slope of the Castle hill. Decaying fast, and hollow.—(*Dec.* 24, 1872, *G. C. Atkinson.*)

RAVENSWORTH.

FIELD MAPLE (*Acer campestre*), 200 yards N. by W. from Castle. Girth at a height of 5 feet, 9 feet 2 inches: spread of branches, 21 yards: height, 51 feet.

A handsome healthy tree; bole ten feet, and then branches into three.—(*May* 28, 1873, *G. C. Atkinson.*)

BEECH, 80 yards S. of the Maple, and the most northerly of a row of Beeches standing N. and S. Girth at a height of 5 feet, 15 feet 9 inches (but the stem bulges out, and this girth is too much): spread of branches, considerable: height, 73 feet.

A handsome healthy tree, though clamped together with iron, and decaying.—(*Ibid.*)

CEDAR OF LEBANON. A noble group of old Cedars grows 270 yards N. of Castle, of which four, in a line a few yards apart (E. and W.), are very large. The girth of the most E., at a height of 5 feet, is 12 feet 1 inch. That of the next on its W., at a height of 5 feet, 12 feet 9 inches. That of the most W., at a height of 5 feet, 14 feet: spread of branches, not great: height of this last tree, 51 feet.

The boles of all are short, varying from (the W. one which is) four feet to seven feet; and then go off in heavy branches: a good deal decayed.—(*Ibid.*)

OAK, 300 yards W.N.W. of Castle. Girth at a height of 5 feet, 15 feet 11 inches: spread of branches, not great: height, 66 feet.

One of the finest of several old Oaks growing on the slope from the Wood to the Castle.—(*Ibid.*)

OAK, on level ground, 600 yards S. of Castle. Girth at a height of 5 feet, 14 feet 8 inches: spread of branches, small: height, 32 feet.

A ruin; quite hollow and decaying.—(*Ibid.*)

OAK (the most S. and finest of a group of nine or ten), 170 yards S. of Castle. Girth at a height of 5 feet, 12 feet 8 inches: spread of branches, 30 yards: height, 68 feet.

Bole twelve feet. All these are fine trees, but decaying fast. —(*May* 28, 1873, *G. C. Atkinson.*)

Scotch Fir (one of the finest of a good many scattered through the High Wood), about 500 yards W. of Castle. Girth at a height of 5 feet, 8 feet 1 inch: spread of branches, not great: height, 82 feet.

A fine tree, but (like all the wood here) suffering from smoke and chemicals.—(*Ibid.*)

REDHEUGH.

Ash, 70 or 80 yards S.E. of Hall. Girth at a height of 5 feet, 12 feet 11 inches: height of tree, say 50 feet.

Hollow, dying, smoked to death.—(*November* 4, 1872, *G. C. Atkinson.*)

RIDLEY HALL.

Larch. Girth at a height of 5 feet, 9 feet 4 inches: spread of branches, 18 yards: height, 90 feet.

About one hundred and thirty years old.—(*Oct.* 30, 1872, *J. Pearson, Bailiff to Mrs. Davidson.*)

Spruce Fir. Girth at a height of 5 feet, 7 feet 3 inches: spread of branches, 8 yards: height, 100 feet.

Growing condition.—(*Ibid.*)

Silver Fir. Girth at a height of 5 feet, 8 feet 7 inches: spread of branches, 10 yards: height, 90 feet.

Growing condition.—(*Ibid.*)

Weymouth Pine. Girth at a height of 5 feet, 7 feet 10 inches: spread of branches, 8 yards: height, 80 feet.

Growing condition.—(*Ibid.*)

Ash. Girth at a height of 5 feet, 13 feet 8 inches: spread of branches, 19 yards: height, 50 feet.

Matured; hollow inside.—*Ibid.*

SALTWELL SIDE, NEAR GATESHEAD.

Mulberry, 20 yards W. of House. Girth at a height of 5 feet, 6 feet 4 inches: spread of branches, 8 yards: height, about 15 feet.

A fine, fairly healthy tree.—(*November* 19, 1872, *G. C. Atkinson.*)

SHAWDON.

Oak, called "The King of the Forest," 50 yards N.W. of little bridge over Shawdon Burn, 350 yards N.N.E. from the Dene House, and nearly 1 mile from the Hall. Girth at a height of 2 feet from N. and 4 feet from S., 17 feet 6 inches: spread of branches, 17 yards: height 68 feet.

A very picturesque tree; beginning to decay. Bole ten feet on the S. side and six feet on the N.; several heavy limbs then stretch far out, especially to E. A curious oval orifice, six inches high by four inches wide, passes through the upper part of bole from N. to S. This tree is much the finest of a grove of old native Oaks which stand on the steep N. slope of the infant Shawdon Burn.—(*April* 28, 1873, *G. C. Atkinson.*)

Oak, called "The Hangman's Oak," about 80 yards N.W. of Shawdon House. Girth at a height of 5 feet, 9 feet 7 inches: spread of branches, considerable: height, 54 feet.

A low spreading tree, near which a good many human bones have been exhumed; and as the tree bears this name, and the lower branches extend in a convenient and suggestive manner, it probably was used for the purposes of rude Border justice.—(*Ibid.*)

Wych Elm, the most western tree of the W. Avenue, 200 yards from House. Girth at a height of 5 feet, 14 feet: spread of branches, 30 yards: height, 90 feet.

Bole twelve feet, then breaks into two or three main stems. A fine tree.—(*Ibid.*)

Wych Elm, 150 yards S.S.E. of House, standing alone in Park, called "The Big Elm." Girth at a height of 5 feet, 13 feet 5 inches: spread of branches, 30 yards: height, 69 feet.

A very handsome healthy tree.—(*Ibid.*)

Pinus sylvestris, 400 yards S.S.E. of House; the most S. and best of three fine ones together. Girth at a height of 5 feet, 8 feet 4 inches: spread of branches, not great: height, 60 feet.

Bole twelve feet, and then divides.—(*Ibid.*)

LIME, about 80 yards S.S.E. of House; the most N. and best in S. Avenue. Girth at a height of 5 feet, 11 feet 5 inches: spread of branches, not great: height, 60 feet.—(*April* 28, 1873, *G. C. Atkinson.*)

COMMON HOLLY. Girth at a height of 5 feet, 6 feet 1 inch: spread of branches, fair: height, 54 feet.

Bole nine feet, then branches.—(*Ibid.*)

VARIEGATED HOLLY. Girth at a height of 1 foot, 6 feet 3 inches: height, 43 feet.—(*Ibid.*)

The two last-mentioned trees (each the best of its kind) stand in a sort of short avenue, about ten yards wide, formed by a row of Common Hollies on the E. side, and Variegated Hollies on the W. side, which runs for about forty yards N. and S.: commencing fifty yards from S.E. corner of House. All fine trees, but too close together for good development.

SIMONBURN.

ELM, in Cottage Garden at the corner of the road from Simonburn to Hall Barns, on E. of road. Girth at a height of 5 feet, 15 feet 2 inches: spread of branches, 27 yards: height, about 100 feet.

A beautiful tree, with round bole of considerable length.—(*August* 16, 1872, *G. C. Atkinson.*)

BEECH, 400 yards along the road to Hall Barns from this, and 150 yards from Hall Barns; which fell across the road from its place on W. of road a few weeks since. Girth at a height of 5 feet, 13 feet 2 inches (stem nearly the same for 40 feet).

It grew on the steep W. bank of a little stream, which had undermined it. On July 26, 1873, I counted the rings on the section of the stump, and found them one hundred and thirty-five. The tree was therefore one hundred and thirty-five years old when it fell.—(*Ibid.*)

SYCAMORE, in Churchyard, the W. and finest of two. Girth at a height of 5 feet, 12 feet 4 inches: spread of branches, 24 yards: height, 68 feet.

Boll twelve feet, and then a fine full healthy head.—(*July* 26, 1873, *ibid.*)

SOURMIRES, QUARTER-MILE W. OF BRADLEY, IN PARISH OF RYTON.

Ash, 30 or 40 yards S.E. of Farm House. Girth at a height of 5 feet, 16 feet 1 inch: spread of branches, 24 yards: height, 53 feet.

A healthy tree; bole ten or twelve feet high, and then branches off; seems at an early period to have lost its top.—(*Oct.* 9, 1872, *G. C. Atkinson.*)

SPITAL, NEAR HEXHAM.

Oak, in Grass Field, ¼-mile W. of House. Girth at a height of 1 foot, 21 feet 6 inches: spread of branches, 18 yards: height, 33 feet.

A fine tree, which begins to branch into three massive branches, almost from the ground; twenty-one feet six inches is therefore more than its girth ought to be; but it is a noble old tree; its largest branch is thirteen feet one inch in girth at five feet from the ground; decaying fast.—(*Oct.* 3, 1872, *G. C. Atkinson.*)

Elm, about 200 yards E. of House. Girth at a height of 5 feet, 14 feet 8 inches: spread of branches, 19 yards: height, 30 feet.

An odd-looking dumpy tree; bole about six feet high, and then small upright branches. Looks like a pollard tree, probably from having lost its head long ago.—(*Ibid.*)

Elm, in wall of Turnpike-road, N. of House, a few yards E. of first milestone from Hexham. Girth at a height of 5 feet, 13 feet 9 inches: spread of branches, 15 yards: height, 39 feet.

A handsome healthy tree.—(*Ibid.*)

Walnut, 100 yards E. of House. Girth at a height of 1 foot 6 inches, 15 feet: spread of branches, 22 yards: height, 40 feet.

A healthy tree, which bears well, and in fine seasons ripens its nuts.—(*Ibid.*)

Lime (third of a row), on E. of House and 50 yards from it. Girth at a height of 5 feet, 11 feet 3 inches: spread of branches, 20 yards: height, 59 feet.

One of a row of five or six Limes; all their stems a little flattened, and therefore give too much girth.

SWARLAND.

Larch, to W. of the Hall. Girth at a height of 5 feet, 8 feet: spread of branches, 18 yards: height, 60 feet.

Supposed to be one hundred and forty years old.—(*September* 18, 1872, *Robert Scott, Gamekeeper.*)

Larch, to W. of the Hall. Girth at a height of 5 feet, 9 feet: spread of branches, 18 yards: height, 60 feet.

Supposed to be one hundred and forty years old.—(*Ibid.*)

ULGHAM, NEAR MORPETH.

Oak (a wonderful ghost of a tree), stands in the Park Wood, at Ulgham, 370 yards W. from dot (.) on Ordnance Map, marked "Old Shaft," on road running N. to S. on E. side of Wood: this dot being 1 mile 1 furlong N. from the village of Ulgham. Girth at a height of 3 feet, 15 feet; at 5 feet, 18 feet 7 inches; at 6 feet, 20 feet 1 inch; at 7 feet, 21 feet 7 inches: height of stump, 26 feet.

A most weird, ghostly tree; more like a huge brown Druidical stone than a tree. No leaves! no bark! no life! Standing in a young plantation, which it overtops eight or ten feet.—(*June* 19, 1873, *G. C. Atkinson.*)

UNTHANK.

Sycamore, variegated, between garden and river. Girth at a height of 5 feet, 9 feet 2 inches: spread of branches, 30 yards.

A fine tree.—(*August* 19, 1872, *G. C. Atkinson.*)

Oak, W. of Hall. Girth at a height of 5 feet, 13 feet 11 inches: spread of branches, 17 yards: height, 60 feet.

A handsome low tree.—(*September* 23, 1872, *Rev. Dixon Brown.*)

WALLINGTON.

Beech, by Turnpike-road, 100 yards E. of Stable-yard Clock Tower. Girth at a height of 5 feet, 11 feet 2 inches: spread of branches, inconsiderable: height, 113 feet.

Bole about thirty feet, then branches; a very fine healthy tree.—(*April* 22, 1873, *G. C. Atkinson.*)

Larch, on S.W. side of Chinese Pond and 20 yards from it. Girth at a height of 5 feet, 9 feet 5 inches: height, 102 feet 6 inches.

Bole about twenty feet, then divides into three or four branches at twenty feet from top.—(*Ibid.*)

There is the stump of another Larch, about 80 yards S. of last, which was blown down some years since. It was then cut across with a saw, when its rings shewed it to be one hundred and thirty-five years old.

The late Sir William Hooker, Professor of Botany, used always to consider these trees to be contemporary with the celebrated Larches at Dunkeld, which were received as great rarities, and planted in a hothouse till they outgrew it; they were then cast out to take their chance in the open air. Sir Walter Trevelyan believes that these had been similarly treated, and points out in this stump, that the annual rings for the first nine or ten years, have been uniform and vigorous; then that for three years (which he suggests was when the trees were first turned out) the rings are meagre and unhealthy; and afterwards, when he supposes they had got well rooted in the open air, the rings increase and go on flourishingly. This stem, which has been cut through with the saw about two feet from the ground, and stands in the ground *in situ*, has a diameter of five feet from N.W. to S.E., and only three feet from S.W. to N.E.; the heart of the tree being much nearer to the N. than to the S.; showing that the growth of wood had extended itself towards the sun.

Small-leafed Lime, at N.W. end of Chinese Pond. Girth at a height of 5 feet, 7 feet 10 inches: spread of branches, considerable: height, 89 feet 6 inches.

Not healthy.—(*Ibid.*)

Larch, at N.W. end of Chinese Pond. Girth at a height of 5 feet, 9 feet 11 inches: spread of branches, not great: height, 110 feet 6 inches.—(*Ibid.*)

Spruce, 100 yards from N.W. side of Chinese Pond. Girth at a height of 5 feet, 8 feet 8 inches: spread of branches, not great: height, 113 feet 6 inches.

Bole twenty feet, and then branches.—(*April* 22, 1873, *G. C. Atkinson.*)

WYCH ELM, at end of Garden Pond. Girth at a height of 5 feet, 14 feet 10 inches: spread of branches, not great: height, 103 feet 6 inches.

Bole fifteen feet, then divides into two upright stems; fine healthy tree.—(*Ibid.*)

ASH, 200 yards W. of Bridge over Wansbeck, 50 yards N. of river, and 450 yards S. of House. Girth at a height of 5 feet, 16 feet 3 inches: spread of branches, 28 yards: height, 72 feet.

A very fine tree; bole fifteen feet high, and then divides into two main stems.—(*Ibid.*)

HOLLY, on Lawn, 100 yards W. of House. Girth at a height of 3 feet, 6 feet 5 inches: spread of branches, 12 yards: height, 45 feet 6 inches.

A very fine, healthy, handsome, bushy tree, sweeping down to the ground.—(*Ibid.*)

Most of the timber at Wallington and Capheaton is very tall and drawn up.

WHITFIELD, 150 FEET ABOVE THE SEA.

PINUS DOUGLASII. Girth at a height of 5 feet, 8 feet 6 inches: height, 74 feet.

Gravelly soil.—(*August*, 1872, *Mrs. Ord.*)

PICEA NOBILIS. Girth at a height of 5 feet, 5 feet 8 inches: height, 68 feet.

Gravelly soil.—(*Ibid.*)

PINUS LARICIO, bank above river. Girth at a height of 5 feet, 8 feet 2 inches: height, 87 feet.

Sixty or seventy years old; others nearly as large.—(*Ibid.*)

WHITTINGHAM.

ASH, at E. end of Village, where the road turns S. over Rimside Moor. Girth at a height of 5 feet, 15 feet 6 inches: spread of branches, 20 yards: height, 85 feet.

Stem bare for thirty feet, then scanty branches to top.—(*April* 24, 1873, *G. C. Atkinson.*)

Willow, close to N. of road from Eslington to Whittingham, and ½-mile W. of Whittingham. Girth at a height of 3 feet, 13 feet: spread of branches, fair: height, 52 feet.

Stem five feet, then branches into a straggling head.—(*Ibid.*)

WHITTLE DENE.

Larch, ¼-mile above Water Mill, and 20 yards on E. of Burn. Girth at a height of 5 feet, 9 feet 3 inches: spread of branches, 19 yards: height, 103 feet.

A fine straight healthy tree; rather crowded in by its neighbours.—(*September* 15, 1872, *G. C. Atkinson.*)

WINDMILL HILLS.

Holly, variegated, in Garden of Mr. Clapham. Girth at a height of 4 feet, 6 feet 3 inches: spread of branches, 9 yards; been much cut in.

Said to be two hundred years old. Dying from smoke and chemicals.—(*August* 13, 1873, *G. C. Atkinson.*)

WYLAM.

Variegated Sycamore, 20 yards N.E. of Hall. Girth at a height of 3 feet, 7 feet: spread of branches, 15 yards: height, 45 feet.

A handsome healthy tree; stem four feet, and then dividing into four.—(*Sept.* 27, *G. C. Atkinson.*)

White Poplar, at N. end of Old Carriage Road, 200 yards N. of House. Girth at a height of 5 feet, 9 feet 9 inches: spread of branches, 24 yards: height, 53 feet.

A fine healthy tree.—(*Ibid.*)

Red Maple, 25 yards N.E. of House. Girth at a height of 5 feet, 3 feet 6 inches: spread of branches, small: height, 48 feet.

Healthy, and a rather uncommon tree; stem about thirteen feet, and then branches.

PLANE (*occidentalis*), 25 yards E.N.E. from House. Girth at a height of 5 feet, 7 feet 1 inch: spread of branches, considerable: height of tree, 53 feet.

All suffering from smoke.—(*Sept.* 27, *G. C. Atkinson.*)

VII.—*Note on Cinerary Vases found at Humbledon Hill, near Sunderland.*

DURING the excavation of a new reservoir for the Sunderland and South Shields Water Company, on the summit of Humbledon Hill, two vases containing charred and broken bones were met with, but being in an exceedingly brittle state, were much broken by the workmen before being noticed. They seemed to be hand-made and dried in the sun, but the contained bones were so comminuted that it is extremely difficult to say whether or not they are partly or altogether human. The vases are marked with a rude zig-zag ornamentation, and were found in an inverted position; near them were two skeletons of great size, and a short iron knife with a carved handle. The Rev. Canon Greenwell, we believe, considers the larger of the two vases to be of a very rare description, having been found in only one other part of England. The fragments into which they were unfortunately broken have been carefully pieced together, and placed in the Sunderland Museum.

At the Marsden Meeting of the Tyneside Naturalists' Field Club, on the 9th of October, 1873, Mr. E. C. Robson described the two vases and the circumstances of their discovery, and at the same time set before the members his own speculations as to their contents, in the following lines:—

What bones be these consigned to rot,
(Not in a box, the common lot),
But pickled in this weird old pot?
Chopped, too, so small, you scarce can tell
Digital chips from clavicle?
Some chief mayhap of olden days

Fills up the measure of this vase—
Was he a Briton bold, or Saxon,
Who laid his foes in fight their backs on—
Who, could his larynx speak a phrase,
Would fill his hearers with amaze?
What unwrit jargon did he utter,
What vile unprinted gutturals sputter?
What might his well-worn molars chew,
Drank he metheglin or cwrw,
Or some forgotten brew? alas
He died before the age of Bass.
Mouldering among these kindred stones
How long has lain this peck of bones?
Was he a savant—in some coterie
Esteemed a swell—who fills this pottery?
Whom did he love? whom fight? whom bully?
Was he an orator like Tully?
Did he, like Odger, move the masses,
And stimulate a war of classes?
Ah, me, if so his jars of war
Have dwindled down to this small jar!
Did he go clad in suit of woad
Tattooed upon his shoulders broad,
Or paint his shivering epidermis?
Went he in armour or "inermis?"
If he'd a wife maybe she decked him
In skins of beasts—perchance henpecked him.
Be it so or not—I'm of opinion,
She wore no bustle—no, or chignon—
Well may we say "Eheu fugaces!"
If these old shards are all the traces
Which now survive to tell the story
Of one who doubtless lived in glory.
Whate'er he might be or might not—
Soldier, saint, sinner, sage, or sot,
One thing is clear—he's gone to pot!

E OF TEMPERATURE IN THE SEVERAL MONTHS

	APRIL.								MAY.					
Mean Daily Range.	Highest Maximum.	Day.	Lowest Minimum.	Day.	Monthly Range.	Mean Daily Maximum.	Mean Daily Minimum.	Mean Daily Range.	Highest Maximum.	Day.	Lowest Minimum.	Day.	Monthly Range.	Mean Daily Maximum.
12·6	64	12, 30	32	6	32	53·5	38·9	14·6	73	26	33	20	40	57·[illegible]
9·7	64	12	33	6	31	50·4	39·6	10·8	66	26	35	18	31	53·[illegible]
14·1	67	12	30	5, 21, 22	37	53·0	35·6	17·4	68	1, 26	31	18	37	56·[illegible]
19·8	74	12	28	3, 6	46	57·2	35·5	21·7	75	1	30	18, 20	45	63·[illegible]
16·3	66	12	28	6	38	51·5	35·2	16·3	64	1	30	18	34	54·[illegible]
9·8	64	12	33	19	31	52·0	39·4	12·6	67	1	34	20	33	54·[illegible]
7·9	62	12	35	3, 19	27	51·0	41·4	9·6	64	1	37	20	27	54·[illegible]
11·9	64	14, 30	34	3	30	55·3	39·8	15·5	69	29	35	20	34	60·[illegible]
14·2	70	12	31	6	39	53·7	38·1	15·6	69	1	32	18	37	57·[illegible]
11·7	66	...	34	...	32	54·3	41·2	13·1	68	...	36	...	32	57·[illegible]
11·7	56	...	27	...	29	49·0	35·6	13·4	62	..	31	...	31	52·[illegible]
11·4	65	12	32	20, 21	33	53·3	38·6	14·7	70	26	32	20	38	57·2
15.2	67	30	30	21, 26, 27	37	54·8	35·5	19·3	71	2	30	19, 20	41	58·[illegible]
11·4	66	12	33	3, 19, 20	33	52·3	39·1	13·2	70	1	33	20	37	55·[illegible]
7·2	66	12	36	3, 20	30	51·5	38·8	12·7	71	1	37	11, 19, 21	34	54·7
17·7	68	11	26	20	42	53·7	33·0	20·7	75	26	27	19, 20	48	59·[illegible]
12·2	67	12, 13	30	20	37	53·2	38·3	14·9	70	1	33	19, 20	37	57·[illegible]
12·6	65·6	...	31·3	...	34·3	52·9	37·9	15·1	68·9	...	32·7	...	36·2	56·[illegible]
15·8	70	12	30	20	40	59·3	40·1	19·2	73	28	33	20	40	62·[illegible]

	OCTOBER.								NOVEMBER.					
13·4	60	1, 2	31	15	29	52·8	40·6	12·2	63	6	31	14	32	48·[illegible]
10·2	60	2	32	15	28	50·5	41·7	8·8	61	6	33	14, 19	28	46·[illegible]
16·2	61	2	28	6	33	52·5	37·4	15·1	61	6	26	19	35	47·[illegible]
18·6	62	2	25	15	37	52·8	36·8	16·0	59	6	26	4, 10	33	45·[illegible]
14·3	55	1, 2, 12, 14, 20	26	5, 6, 15	29	50·1	36·7	13·4	58	6	26	19	32	43·[illegible]
10·6	60	2	32	15	28	51·5	41·6	9·9	67	6	32	19	35	50·[illegible]
8·5	59	2	35	15	24	50·4	43·2	7·2	61	6	35	14, 19, 20	26	46·[illegible]
14·4	62	1	35	6	27	52·2	42·2	10·0	61	6	33	10, 19	28	48·[illegible]
14·7	63	2	30	15	33	55·1	39·5	15·6	64	6	29	4	35	48·[illegible]
12·0	61	...	34	...	27	52·8	41·7	11·1	61	...	32	...	29	47·[illegible]
13·7	55	...	28	...	27	48·8	37·4	11·4	55	...	28	...	27	43·[illegible]
14·2	60	2	28	15	32	52·6	39·5	13·1	61	6	31	19	30	46·[illegible]
15·6	60	1, 2, 3	30	4, 16	30	50·7	38·8	11·9	62	6	29	5, 19	33	48·[illegible]
13·4	63	2	30	15	33	53·2	40·1	13·1	61	5	31	4	30	47·[illegible]
9·2	60	2	38	6, 12, 15, 16	22	50·7	44·3	6·4	58	5, 6	35	11, 13	23	47·[illegible]
20·6	66	5	26	6	40	51·9	37·0	14·9	64	6	28	4, 18	36	47·[illegible]
...	61	2	29	6, 15	32	52·8	39·7	13·1	61	6	30	4, 29	31	47·[illegible]
13·7	60·5	...	30·4	...	30·1	51·8	39·8	12·0	61·1	...	30·3	...	30·8	47·[illegible]
19·1	67	2	29	14	38	56·7	41·1	15·6	62	5	32	18	30	50·[illegible]

Fills up the measure of this vase—
Was he a Briton bold, or Saxon,
Who laid his foes in fight their backs on—
Who, could his larynx speak a phrase,
Would fill his hearers with amaze?
What unwrit jargon did he utter,
What vile unprinted gutturals sputter?
What might his well-worn molars chew,
Drank he metheglin or cwrw,
Or some forgotten brew? alas
He died before the age of Bass.
Mouldering among these kindred stones
How long has lain this peck of bones?
Was he a savant—in some coterie
Esteemed a swell—who fills this pottery?
Whom did he love? whom fight? whom bully?
Was he an orator like Tully?
Did he, like Odger, move the masses,
And stimulate a war of classes?
Ah, me, if so his jars of war
Have dwindled down to this small jar!
Did he go clad in suit of woad
Tattooed upon his shoulders broad,
Or paint his shivering epidermis?
Went he in armour or "inermis?"
If he'd a wife maybe she decked him
In skins of beasts—perchance henpecked him.
Be it so or not—I'm of opinion,
She wore no bustle—no, or chignon—
Well may we say "Eheu fugaces!"
If these old shards are all the traces
Which now survive to tell the story
Of one who doubtless lived in glory.
Whate'er he might be or might not—
Soldier, saint, sinner, sage, or sot,
One thing is clear—he's gone to pot!

RELATIVE PREVALENCE, DIRECTION, AND AMOUNT OF WIND IN THE SEVERAL MONTHS OF 1872.

JANUARY.

STATIONS.	N. ½ E.–E.		E. ½ S.–S.		S. ½ W.–W.		W. ½ N.–N.	
	Days	Force	Days	Force	Days	Force	Days	Force
Alnwick	1	0·6	5	1·2	22	1·3	3	0·6
North Sunderland	3	1·3	14	1·5	11	2·0	3	1·3
Rothbury	4	...	3	...	16	...	8	...
Cresswell	3	...	9	...	17	...	2	...
Meldon	5	...	6	...	11	...	8	...
Wallington (D.)	5	2·1	7	1·8	13	1·8	6	1·7
Cullercoats	...	...	...	...	...	...	...	...
North Shields (I.)	2	2·3	6	1·4	16	1·9	4	1·8
Seaham Hall	5	1·4	8	1·9	15	2·3	2	3·5
Sedgefield	2	2·5	12	2·5	13	2·4	4	2·8
East Hartlepool	3	1·5	2	1·5	23	2·3	3	2·0
Darlington	2	...	10	...	17	...	2	...
Gainford	5	...	6	...	13	...	7	...
Average	4	1·9	8	1·8	15	2·1	4	2·2

FEBRUARY.

STATIONS.	N. ½ E.–E.		E. ½ S.–S.		S. ½ W.–W.		W. ½ N.–N.	
	Days	Force	Days	Force	Days	Force	Days	Force
Alnwick	2	1·1	13	1·1	13	0·9	1	0·8
North Sunderland	1	3·0	20	1·6	7	1·0	1	1·0
Rothbury	5	...	9	...	11	...	4	...
Cresswell	1	...	9	...	16	...	3	...
Meldon	2	...	17	...	9	...	1	...
Wallington (D.)	2	2·0	11	2·4	14	1·7	2	0·8
Cullercoats	5	2·2	13	1·8	11	1·5	0	...
North Shields (I.)	1	2·5	11	2·0	14	1·4	2	1·0
Seaham Hall	2	1·5	14	1·3	9	1·1	4	1·0
Sedgefield	2	2·0	17	2·2	8	1·6	2	2·0
East Hartlepool	1	2·0	7	2·1	18	1·9	3	1·5
Darlington	4	...	13	...	11	...	1	...
Gainford	9	...	6	...	11	...	3	...
Average	3	2·2	12	1·9	12	1·4	2	1·2

MARCH.

STATIONS.	N. ½ E.–E.		E. ½ S.–S.		S. ½ W.–W.		W. ½ N.–N.	
	Days	Force	Days	Force	Days	Force	Days	Force
Alnwick	5	1·1	8	0·8	14	0·9	4	1·0
North Sunderland	7	2·3	12	1·2	8	1·8	4	1·9
Rothbury	7	...	9	...	5	...	10	...
Cresswell	6	...	7	...	12	...	6	...
Meldon	8	...	5	...	12	...	5	...
Wallington (D.)	6	4·7	8	1·3	11	1·7	6	1·9
Cullercoats	6	1·8	9	1·5	9	1·5	7	2·1
North Shields (I.)	7	2·2	4	1·3	14	1·2	6	1·5
Seaham Hall	5	1·8	15	0·9	5	1·8	6	1·5
Sedgefield	6	2·3	2	3·0	18	2·0	5	2·4
East Hartlepool	7	2·5	2	1·3	17	1·7	5	1·8
Darlington	7	...	3	...	18	...	3	...
Gainford	4	...	4	...	12	...	11	...
Average	6	2·5	7	1·5	12	1·7	6	1·9

APRIL.

STATIONS.	N. ½ E.–E.		E. ½ S.–S.		S. ½ W.–W.		W. ½ N.–N.	
	Days	Force	Days	Force	Days	Force	Days	Force
Alnwick	5	...	6	...	11	...	7	...
North Sunderland	3	2·7	9	1·2	10	2·2	8	3·2
Rothbury	7	...	5	...	10	...	8	...
Cresswell	5	...	7	...	7	...	11	...
Meldon	6	...	2	...	13	...	9	...
Wallington (D.)	9	2·5	2	0·8	6	1·9	13	3·0
Cullercoats	4	2·0	8	1·5	6	1·3	12	1·8
North Shields (I.)	7	1·8	6	1·3	10	2·0	7	3·1
Seaham Hall	8	1·8	7	1·1	6	1·5	9	2·3
Sedgefield	9	2·0	5	2·0	8	2·3	8	3·6
East Hartlepool	6	2·5	5	1·7	11	1·8	8	2·5
Darlington	10	...	2	...	16	...	2	...
Gainford	7	...	3	...	8	...	12	...
Average	7	2·2	5	1·4	9	1·9	9	2·8

MAY.

STATIONS.	N. ½ E.–E.		E. ½ S.–S.		S. ½ W.–W.		W. ½ N.–N.	
	Days	Force	Days	Force	Days	Force	Days	Force
Alnwick	7	...	1	...	15	...	6	...
North Sunderland	2	1·3	5	2·0	11	1·5	13	1·5
Rothbury	10	...	1	...	12	...	8	...
Cresswell	10	...	5	...	14	...	2	...
Meldon	4	...	1	...	13	...	12	...
Wallington (D.)	10	2·2	0	...	11	2·7	10	1·5
Cullercoats	...	...	...	...	...	...	...	...
North Shields (I.)	6	2·1	0	...	14	1·4	9	1·6
Seaham Hall	7	1·7	5	1·2	16	1·4	3	2·0
Sedgefield	3	2·3	1	2·0	18	1·7	9	2·1
East Hartlepool	11	3·3	0	...	16	1·6	4	1·9
Darlington	9	...	0	...	20	...	2	...
Gainford	3	...	3	...	15	...	10	...
Average	7	2·2	2	1·7	15	1·7	7	1·8

JUNE.

STATIONS.	N. ½ E.–E.		E. ½ S.–S.		S. ½ W.–W.		W. ½ N.–N.	
	Days	Force	Days	Force	Days	Force	Days	Force
Alnwick.	1	0·5	5	0·9	19	0·9	1	2·2
North Sunderland.	0	...	13	1·0	13	1·6	4	1·3
Rothbury.	0	...	5	...	24	...	1	...
Cresswell.	3	...	10	...	12	...	5	...
Meldon.	1	...	7	...	16	...	5	...
Wallington (D.).	1	1·5	6	1·6	15	1·5	8	2·8
Cullercoats.	...	...	...	...	...	...	...	...
North Shields (I.).	4	1·3	7	1·2	13	1·4	4	1·6
Seaham Hall.	4	1·6	4	1·3	18	0·9	4	1·9
Sedgefield.	3	1·2	6	1·5	17	1·6	4	2·5
East Hartlepool.	5	1·1	7	1·4	15	1·7	3	2·0
Darlington.	4	...	5	...	19	...	2	...
Gainford.	1	...	4	...	17	...	8	...
Average.	2	1·3	7	1·3	16	1·5	4	2·0

JULY.

Alnwick	10	0·6	4	0·5	9	0·8	6	0·8
North Sunderland	4	0·9	7	0·8	11	1·3	9	1·7
Rothbury	3	...	4	...	15	...	9	...
Cresswell	14	...	3	...	11	...	8	...
Meldon	2	...	2	...	16	...	10	...
Wallington (D.)	12	2·3	3	1·5	10	1·8	5	1·7
North Shields (I.)	10	1·7	3	0·7	9	1·1	8	1·4
South Shields	...	...	...	...	...	...	...	...
Seaham Hall	12	1·0	6	0·5	6	0·5	7	1·6
Sedgefield	8	1·8	10	0·8	8	1·1	5	2·4
East Hartlepool	11	1·7	7	1·1	9	1·1	4	1·8
Darlington	5	...	5	...	14	...	7	...
Gainford	7	...	2	...	7	...	15	...
Average	8	1·6	5	0·9	11	1·1	7	1·8

AUGUST.

Alnwick	15	0·4	6	0·6	6	1·1	3	0·8
North Sunderland	3	1·0	11	1·0	4	1·6	13	1·3
Rothbury	7	...	12	...	1	...	11	...
Cresswell	11	...	12	...	4	...	4	...
Meldon	6	...	8	...	8	...	9	...
Wallington (D.)	17	1·4	1	0·0	8	2·3	5	1·4
North Shields (I.)	11	1·2	6	1·1	8	1·1	6	1·7
South Shields	...	...	...	...	...	...	...	...
Seaham Hall	11	0·9	5	1·2	4	2·0	11	1·9
Sedgefield	12	1·4	5	1·0	8	1·7	6	2·5
East Hartlepool	10	1·4	3	1·3	10	1·5	8	1·9
Darlington	15	...	7	...	6	...	3	...
Gainford	6	...	4	...	8	...	10	...
Average	10	1·2	7	0·9	6	1·7	8	1·8

SEPTEMBER.

Alnwick	2	0·5	1	0·6	18	1·3	9	1·2
North Sunderland	1	0·5	7	1·0	10	2·0	12	2·8
Rothbury	5	...	1	...	15	...	9	...
Cresswell	0	...	6	...	9	...	15	...
Meldon	5	...	1	...	16	...	8	...
Wallington (D.)	2	2·8	4	1·8	14	2·5	10	3·5
North Shields (I.)	1	1·0	2	1·0	14	1·8	13	1·5
South Shields	...	...	...	...	...	...	...	...
Seaham Hall	0	...	4	1·6	6	1·4	20	1·7
Sedgefield	2	0·8	2	2·0	16	2·4	10	2·6
East Hartlepool	3	2·0	2	1·8	11	1·8	14	2·1
Darlington	6	...	2	...	13	...	9	...
Gainford	0	...	0	...	18	...	9	...
Average	2	1·4	3	1·5	13	2·0	12	2·4

OCTOBER.

Alnwick	1	0·7	4	1·0	14	1·3	7	1·1
North Sunderland	2	1·8	9	1·5	16	1·5	4	3·5
Rothbury	5	...	1	...	13	...	12	...
Cresswell	1	...	5	...	16	...	9	...
Meldon	2	...	8	...	10	...	10	...
Wallington (D.)	3	2·3	3	1·0	13	1·8	12	1·4
North Shields (I.)	2	2·0	6	1·5	16	1·1	7	1·9
South Shields	4	0·9	4	1·8	17	1·3	6	1·7
Seaham Hall	3	1·0	9	1·6	13	1·4	6	1·8
Sedgefield	3	1·5	4	2·5	17	1·4	7	2·2
East Hartlepool	3	1·8	0	...	22	1·9	6	2·2
Darlington	5	...	7	...	12	...	7	...
Gainford	5	...	4	...	10	...	12	...
Average	3	1·6	5	1·7	15	1·5	8	2·1

NOVEMBER.

Alnwick	4	1·3	5	0·9	17	1·4	4	1·1
North Sunderland	6	2·8	10	1·3	10	2·4	4	2·5
Rothbury	7	...	5	...	11	...	7	...
Cresswell	4	...	7	...	12	...	7	...
Meldon	4	...	9	...	8	...	8	...
Wallington (D.)	7	3·4	3	3·2	14	2·9	6	2·2
North Shields (I.)	4	2·8	5	1·6	13	1·6	6	1·6
South Shields	5	2·0	4	0·3	14	1·3	7	1·1
Seaham Hall	5	1·6	3	1·7	16	1·3	6	1·5
Sedgefield	6	0·9	8	0·9	12	1·3	4	1·9
East Hartlepool	4	3·3	2	1·3	19	2·1	5	2·4
Darlington	4	...	14	...	10	...	2	...
Gainford	6	...	5	...	11	...	8	...
Average	5	2·4	6	1·5	13	1·8	6	1·9

DECEMBER.

Alnwick.	2	1·7	9	1·4	13	1·2	7	0·8
North Sunderland.	4	3·3	14	1·8	6	2·8	7	1·2
Rothbury.	13	...	6	...	5	...	7	...
Cresswell.	3	...	14	...	7	...	7	...
Meldon.	6	...	4	...	12	...	7	...
Wallington (D.).	6	2·9	12	1·5	6	3·3	7	1·9
North Shields (I.).	5	2·1	11	2·4	9	1·2	4	2·0
South Shields.	5	1·2	7	1·9	13	1·2	6	1·3
Seaham Hall.	12	1·2	8	1·4	3	1·3	8	1·1
Sedgefield.	9	0·7	8	0·8	7	0·9	7	0·7
East Hartlepool.	3	2·7	7	2·9	15	2·1	6	2·1
Darlington.	10	...	13	...	4	...	4	...
Gainford.	6	...	6	...	5	...	14	...
Average.	7	2·0	9	1·8	8	1·8	7	1·5

OF 1872.

Mean Daily Minimum.	Mean Daily Range.	Highest Maximum.	Day.	Lowest Minimum.	Day.	Monthly Range.	Mean Daily Maximum.	Mean Daily Minimum.	Mean Daily Range.	STATIONS.
		JUNE.								
41·7	15·8	73	16	40	6	33	65·7	47·8	17·9	North Sunderland.
42·2	11·1	69	16, 17	41	1	28	61·8	49·4	12·4	Alnwick.
38·8	17·8	74	16, 18	37	1	37	66·4	46·2	20·2	Rothbury.
38·1	25·4	80	16, 18 21	32	1	48	70·6	45·1	25·5	Meldon.
37·5	16·5	78	14	36	6	42	64·9	44·9	20·0	Wallington.
42·0	12·7	71	16	40	1	31	62·6	49·0	13·6	North Shields (S.).
44·8	9·5	71	16	44	1	27	62·3	51·8	10·5	North Shields (I.)
43·9	16·2	78	16	42	1, 3	36	65·8	48·3	17·5	South Shields.
41·3	16·4	81	17	38	7	43	66·3	48·5	17·8	Wylam.
44·7	13·2	76	...	44	...	32	67·1	52·7	14·4	Bywell.
38·8	14·0	75	...	35	...	40	62·8	46·4	16·4	Allenheads.
41·0	16·2	82	18	37	7	45	67·3	47·7	19·6	Durham.
38·2	20·4	72	15, 16 17	40	1, 4, 6 8, 9 16, 18	32	66·0	45·8	20·2	Seaham Hall.
40·9	14·9	79	18	38	7	41	64·3	48·4	15·9	Sedgefield.
44·9	9·8	71	16, 20 23	40	5	31	62·9	52·8	10·1	East Hartlepool.
37·3	22·4	85	18	34	6	51	71·3	46·8	24·5	Darlington.
40·7	16·6	78	18	37	7	41	66·2	47·3	18·9	Gainford.
40·9	15·8	76·1	...	38·5	...	37·5	65·5	48·2	17·4	Average.
42·5	19·6	86	17	41	7	45	71·3	50·0	21·3	Greenwich.
		DECEMBER.								
37·2	11·7	51	23, 27	23	5	28	43·7	35·4	8·3	North Sunderland.
38·8	8·1	53	24	27	5, 12	26	42·7	36·4	6·3	Alnwick.
33·5	13·7	51	26	22	5, 12 13	29	43·0	31·2	11·8	Rothbury.
34·3	11·3	49	23, 27, 28 31	19	5, 12	30	41·1	32·7	8·4	Meldon.
34·3	9·3	48	23, 27	19	5	29	39·2	33·1	6·1	Wallington.
39·2	11·0	50	27	26	12	24	44·7	37·1	7·6	North Shields (S.).
40·3	6·5	50	27	29	12, 13	21	43·3	38·5	4·8	North Shields (I.)
39·2	9·1	51	27, 28	27	12	24	44·6	37·0	7·6	South Shields.
37·4	11·5	53	23, 27	21	5	32	44·6	35·1	9·5	Wylam.
39·3	8·6	56	...	25	...	31	44·8	37·0	7·8	Bywell.
34·5	9·4	48	...	14	...	34	39·5	30·6	8·9	Allenheads.
36·6	10·0	51	23	24	12	27	42·2	35·1	7·1	Durham.
35·7	12·5	50	26	23	5	27	43·6	33·8	9·8	Seaham Hall.
37·3	10·1	49	27	24	5	25	42·5	35·1	7·4	Sedgefield.
41·0	6·4	49	23, 25 27	28	12, 13	21	43·3	38·6	4·7	East Hartlepool.
35·6	11·6	50	1, 7 27, 28	20	5	30	41·5	33·4	8·1	Darlington.
37·8	9·5	52	23, 27	25	5, 12 13	27	42·4	34·6	7·8	Gainford.
37·2	10·0	50·6	...	23·3	...	27·3	42·7	35·0	7·8	Average.
40·8	10·0	55	22	27	12	28	47·0	38·7	8·3	Greenwich.

2. Absolute Temperatures.

OF 1872.

JUNE.			STATIONS.
Mean Temp. Dry Bulb.	Mean Temp. Wet Bulb.	Mean Relative Humidity.	
59·9	58·3	90	North Sunderland (9 A.M.).
58·6	55·4	80	Rothbury (9 A.M.).
...	...	79	North Shields (S.).
57·7	53·5	75	North Shields (I., 8 A.M.).
57·8	54·0	77	Wylam (8 A.M.).
...	...	78	Bywell.
...	...	82	Allenheads.
55·6	52·1	78	Durham (10 A.M. and 10 P.M.).
58·2	53·6	73	Sedgefield (9 A.M.).
57·3	53·4	76	East Hartlepool (9 A.M.).
60·1	55·5	73	Gainford (9 A.M.).
58·2	54·5	78	Average.
...	...	75	Greenwich.
DECEMBER.			
40·5	39·6	93	North Sunderland (9 A.M.).
37·8	37·3	96	Rothbury (9 A.M.).
...	...	82	North Shields (S.).
40·7	39·6	91	North Shields (I., 8 A.M.).
46·3	43·4	80	South Shields (10 A.M.).
39·1	37·7	89	Wylam (8 A.M.).
...	...	80	Bywell.
...	...	94	Allenheads.
39·5	38·2	90	Durham (10 A.M. and 10 P.M.).
38·3	37·4	93	Sedgefield (9 A.M.).
41·2	39·4	86	East Hartlepool (9 A.M.).
40·0	38·9	91	Gainford (9 A.M.).
40·4	39·1	89	Average.
...	...	88	Greenwich.

MEAN AMOUN

STATIONS.
North Shields (S.) ...
Bywell ....
Allenheads...............
Durham..................
Sedgefield ....
Average..................
Greenwich...............

STATIONS-
North Shields (S.) ..
Bywell ....
Allenheads ....
Durham..................
Sedgefield ....
Average..................
Greenwich...............

ABSOLUTE AND AVERAGE EXTREMES AND RANGE OF TEMPERATURE IN THE SEVERAL MONTHS OF 1872.

STATIONS.	JANUARY.								FEBRUARY.								MARCH.							
	Highest Maximum.	Day.	Lowest Minimum.	Day.	Monthly Range.	Mean Daily Maximum.	Mean Daily Minimum.	Mean Daily Range.	Highest Maximum.	D.y.	Lowest Minimum.	Day.	Monthly Range.	Mean Daily Maximum.	Mean Daily Minimum.	Mean Daily Range.	Highest Maximum.	Day.	Lowest Minimum.	Day.	Monthly Range.	Mean Daily Maximum.	Mean Daily Minimum.	Mean Daily Range.
North Sunderland......	55	30	27	10, 15, 21, 22	28	44·7	33·5	11·2	53	29	30	8	23	46.0	36·2	9·8	59	16	26	26	33	48·6	36·0	12·6
Alnwick..................	52	30	28	10	24	42·9	35·2	7·7	51	29	30	8	21	46·3	38·7	7·6	57	5	29	21, 26	28	46·8	37·1	9·7
Rothbury	52	30, 31	23	10	29	44·5	32·3	12·2	51	29	25	8	26	45·9	34·1	11·8	59	4, 5	25	26	34	48·2	34·1	14·1
Meldon	54	31	25	9, 10	29	43·2	33·3	9·9	55	29	26	8	29	46·8	35·5	11·3	63	5	19	26	44	52·9	33·1	19·8
Wallington..............	51	30	21	10	30	40·2	31·8	8·4	50	29	24	8	26	43·1	34·0	9·1	59	4	22	26	37	49·3	33 0	16·3
North Shields (S.)	56	30	28	21	28	46·0	35·3	10·7	54	1	33	8	21	47·8	38·9	8·9	56	16	25	26	31	47·2	37·4	9·8
North Shields (I.)	52	30	31	9, 10, 21	21	42·3	36·7	5·6	52	29	34	17	18	44·8	39·3	5·5	54	3, 4, 15, 16, 17, 29	28	26	26	46·7	38·8	7·9
South Shields..........	54	30	...	...	...	44·6	35·8	8·8	55	29	34	8, 17	21	47·1	38·3	8·8	58	29	27	26	31	49·7	37·8	11·9
Wylam	57	30	23	10	34	45·5	34·3	11·2	55	29	27	8	28	48·1	36·8	11·3	61	3	24	26	37	50·3	36·1	14·2
Bywell....................	56	...	27	...	29	44·9	36·4	8·5	55	...	31	...	24	48·1	38·2	9·9	60	...	27	...	33	49·4	37·7	11·7
Allenheads..............	48	...	24	...	24	39·7	32·2	7·5	49	...	28	...	21	44·0	35.5	8·5	55	...	21	...	34	45·5	33·8	11·7
Durham..................	53	30	24	21	29	42·8	33·9	8·9	53	29	29	8	24	45·3	37·0	8·3	59	6	26	26	33	48·0	36·6	11·4
Seaham Hall...........	55	30	23	21	32	43·4	31·7	11·7	55	29	27	8	28	45·3	35·1	10·2	59	30	24	26	35	49·6	34·4	15.2
Sedgefield	53	30	23	21	30	42·9	34·2	8·7	53	1	31	17	22	45·5	38·8	6·7	60	30	25	26	35	47·8	36·4	11·4
East Hartlepool........	52	30	27	21	25	42·9	37·1	5·8	52	29	35	17	17	44·6	40·2	4·4	57	16	27	26	30	46·6	39·4	7·2
Darlington..............	54	14	20	15, 21	34	42·5	31·8	10·7	55	29	25	16	30	45·9	35·0	10·9	62	6	21	26	41	51·2	33·5	17·7
Gainford.................	53	12, 30, 31	22	21	31	43·1	33·9	9·2	54	29	29	17	25	46·1	36·4	9·7	58	7, 16	24	26	34	48·4	36·2	12·2
Average..................	53·4	...	24·8	...	28·6	43·3	34·1	9·2	53·1	...	29·3	...	23·8	45·9	36·9	9·0	58·6	...	24·7	...	33·9	48·6	36·0	12·6
Greenwich............ ..	53	31	28	15	25	46·3	37·0	9·3	58	9	32	28	26	51·7	39·2	12·5	61	7	26	26	35	53·5	37·7	15·8

STATIONS.	APRIL.								MAY.								JUNE.							
	Highest Maximum.	Day.	Lowest Minimum.	Day.	Monthly Range.	Mean Daily Maximum.	Mean Daily Minimum.	Mean Daily Range.	Highest Maximum.	Day.	Lowest Minimum.	Day.	Monthly Range.	Mean Daily Maximum.	Mean Daily Minimum.	Mean Daily Range.	Highest Maximum.	Day.	Lowest Minimum.	Day.	Monthly Range.	Mean Daily Maximum.	Mean Daily Minimum.	Mean Daily Range.
North Sunderland.	64	12, 30	32	6	32	53·5	38·9	14·6	73	26	33	20	40	57·5	41·7	15·8	73	16	40	6	33	65·7	47·8	17·9
Alnwick.	64	12	33	6	31	50·4	39·6	10·8	66	26	35	18	31	53·3	42·2	11·1	69	16, 17	41	1	28	61·8	49·4	12·4
Rothbury.	67	12	30	5, 21, 22	37	53·0	35·6	17·4	68	1, 26	31	18	37	56·6	38·8	17·8	74	16, 18	37	1	37	66·4	46·2	20·2
Meldon.	74	12	28	3, 6	46	57·2	35·5	21·7	75	1	30	18, 20	45	63·5	38·1	25·4	80	16, 18, 21	32	1	48	70·6	45·1	25·5
Wallington.	66	12	28	6	38	51·5	35·2	16·3	64	1	30	18	34	54·0	37·5	16·5	78	14	36	6	42	64·9	44·9	20·0
North Shields (S.).	64	12	33	19	31	52·0	39·4	12·6	67	1	34	20	33	54·7	42·0	12·7	71	16	40	1	31	62·6	49·0	13·6
North Shields (I.)	62	12	35	3, 19	27	51·0	41·4	9·6	64	1	37	20	27	54·3	44·8	9·5	71	16	44	1	27	62·3	51·8	10·5
South Shields.	64	14, 30	34	3	30	55·3	39·8	15·5	69	29	35	20	34	60·1	43·9	16·2	78	16	42	1, 3	36	65·8	48·3	17·5
Wylam.	70	12	31	6	39	53·7	38·1	15·6	69	1	32	18	37	57·7	41·3	16·4	81	17	38	7	43	66·3	48·5	17·8
Bywell.	66	...	34	...	32	54·3	41·2	13·1	68	...	36	...	32	57·9	44·7	13·2	76	...	44	...	32	67·1	52·7	14·4
Allenheads.	56	...	27	...	29	49·0	35·6	13·4	62	..	31	...	31	52·8	38·8	14·0	75	...	35	...	40	62·8	46·4	16·4
Durham.	65	12	32	20, 21	33	53·3	38·6	14·7	70	26	32	20	38	57·2	41·0	16·2	82	18	37	7	45	67·3	47·7	19·6
Seaham Hall.	67	30	30	21, 26, 27	37	54·8	35·5	19·3	71	2	30	19, 20	41	58·6	38·2	20·4	72	15, 16, 17	40	1, 4, 6, 8, 9, 16, 18	32	66·0	45·8	20·2
Sedgefield.	66	12	33	3, 19, 20	33	52·3	39·1	13·2	70	1	33	20	37	55·8	40·9	14·9	79	18	38	7	41	64·3	48·4	15·9
East Hartlepool.	66	12	36	3, 20	30	51·5	38·8	12·7	71	1	37	11, 19, 21	34	54·7	44·9	9·8	71	16, 20, 23	40	5	31	62·9	52·8	10·1
Darlington.	68	11	26	20	42	53·7	33·0	20·7	75	26	27	19, 20	48	59·7	37·3	22·4	85	18	34	6	51	71·3	46·8	24·5
Gainford.	67	12, 13	30	20	37	53·2	38·3	14·9	70	1	33	19, 20	37	57·3	40·7	16·6	78	18	37	7	41	66·2	47·3	18·9
Average.	65·6	...	31·3	...	34·3	52·9	37·9	15·1	68·9	...	32·7	...	36·2	56·8	40·9	15·8	76·1	...	38·5	...	37·5	65·5	48·2	17·4
Greenwich.	70	12	30	20	40	59·3	40·1	19·2	73	28	33	20	40	62·1	42·5	19·6	86	17	41	7	45	71·3	50·0	21·3

STATIONS.	JULY.								AUGUST.								SEPTEMBER.							
North Sunderland......	84	21	43	18	41	68.2	52·3	15·9	72	17	39	31	33	64·8	51·3	13·5	70	5, 13	36	21	34	60·3	46·9	13·4
Alnwick..................	78	21	45	17, 18	33	65·5	53·4	12·1	72	17	44	4	28	61·7	51·3	10·4	68	5	38	20, 21	30	58·1	47·9	10·2
Rothbury	83	21	41	1, 18	42	70·3	49·9	20·4	75	16	39	5	36	65·6	49·1	16·5	70	5	33	21	37	59·8	43·6	16·2
Meldon	90	5	39	10	51	75·1	50·9	24·2	81	24	36	4	45	72·1	47·9	24·2	73	7	32	21	41	61·9	43·3	18·6
Wallington..............	84	5	36	18	48	68·3	48·3	20·0	74	18, 24	33	4	41	65·8	46·2	19·6	72	4	31	21	41	57·6	43·3	14·3
North Shields (S.)	81	21	47	10	34	66·1	53·9	12·2	72	17	45	4	27	61·5	52·2	9·3	70	11	36	21	34	58·6	48·0	10·6
North Shields (I.)	80	21	50	17, 18	30	65·8	56·2	9·6	71	17	48	4	23	62·3	54·1	8·2	70	13	39	22	31	58·5	50·0	8·5
South Shields	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	74	13	...	...	...	62·4	48·0	14·4
Wylam	86	4	42	18	44	71·5	52·7	18·8	78	17	40	4	38	66·5	50·7	15·8	75	7	34	22	41	61·4	46·7	14·7
Bywell	83	...	46	...	37	70·0	56·7	13·3	80	...	48	...	32	67·6	55·0	12·6	72	...	37	...	35	60·0	48·0	12·0
Allenheads..............	83	...	40	...	43	68·0	51·0	17·0	74	...	38	...	36	61·2	47·1	14·1	70	...	32	...	38	57·7	44·0	13·7
Durham..................	84	21	44	10	40	72·4	52·4	20·0	78	18	40	4	38	66·6	51·0	15·6	73	13	34	21	39	60·6	46·4	14·2
Seaham Hall...........	83	22	40	20	43	69·3	50·4	18·9	73	17	42	4	31	63·7	48·5	15·2	73	16	34	21, 22	39	61·4	45·8	15·6
Sedgefield	83	21	45	3, 18	38	68·6	53·0	15·6	74	18	42	4	32	63·9	51·7	12·2	73	13	42	24	31	60·3	46·9	13·4
East Hartlepool........	86	21	50	18	36	66·4	56·6	9·8	77	17	48	4, 28	29	62·4	54·7	7·7	71	13	38	22	33	59·3	50·1	9·2
Darlington..............	90	21	42	10, 18	48	77·4	51·1	26·3	85	18	40	28, 29	45	69·3	48·6	20·7	78	12	33	20	45	64·7	44·1	20·6
Gainford	84	21	43	10, 18	41	71·3	53·0	18·3	80	18	...	...	...	...	...	...	73	12	36	21, 22	37	...	...	...
Average..................	83·9	...	43·3	...	40·6	69·7	52·6	17·1	76·0	...	41·5	...	34·3	65·0	50·6	14·4	72·1	...	35·3	...	36·6	60·2	46·4	13·7
Greenwich................	91	25	47	18	44	78·2	54·8	23·4	82	17	45	28	37	72·9	52·5	20·4	81	3	34	23	47	68·2	49·1	19·1

STATIONS.	OCTOBER.								NOVEMBER.								DECEMBER.							
North Sunderland.	60	1, 2	31	15	29	52·8	40·6	12·2	63	6	31	14	32	48·9	37·2	11·7	51	23, 27	23	5	28	43·7	35·4	8·3
Alnwick.	60	2	32	15	28	50·5	41·7	8·8	61	6	33	14, 19	28	46·9	38·8	8·1	53	24	27	5, 12	26	42·7	36·4	6·3
Rothbury.	61	2	28	6	33	52·5	37·4	15·1	61	6	26	19	35	47·2	33·5	13·7	51	26	22	5, 12, 13	29	43·0	31·2	11·8
Meldon.	62	2	25	15	37	52·8	36·8	16·0	59	6	26	4, 10	33	45·6	34·3	11·3	49	23, 27, 28, 31	19	5, 12	30	41·1	32·7	8·4
Wallington.	55	1, 2, 12, 14, 20	26	5, 6, 15	29	50·1	36·7	13·4	58	6	26	19	32	43·6	34·3	9·3	48	23, 27	19	5	29	39·2	33·1	6·1
North Shields (S.).	60	2	32	15	28	51·5	41·6	9·9	67	6	32	19	35	50·2	39·2	11·0	50	27	26	12	24	44·7	37·1	7·6
North Shields (I.)	59	2	35	15	24	50·4	43·2	7·2	61	6	35	14, 19, 20	26	46·8	40·3	6·5	50	27	29	12, 13	21	43·3	38·5	4·8
South Shields.	62	1	35	6	27	52·2	42·2	10·0	61	6	33	10, 19	28	48·3	39·2	9·1	51	27, 28	27	12	24	44·6	37·0	7·6
Wylam.	63	2	30	15	33	55·1	39·5	15·6	64	6	29	4	35	48·9	37·4	11·5	53	23, 27	21	5	32	44·6	35·1	9·5
Bywell.	61	...	34	...	27	52·8	41·7	11·1	61	...	32	...	29	47 9	39·3	8·6	56	...	25	...	31	44·8	37·0	7·8
Allenheads.	55	...	28	...	27	48·8	37·4	11·4	55	...	28	...	27	43·9	34·5	9·4	48	...	14	...	34	39·5	30·6	8·9
Durham.	60	2	28	15	32	52·6	39·5	13·1	61	6	31	19	30	46·6	36·6	10·0	51	23	24	12	27	42·2	35·1	7·1
Seaham Hall.	60	1, 2, 3	30	4, 16	30	50·7	38·8	11·9	62	6	29	5, 19	33	48·2	35·7	12·5	50	26	23	5	27	43·6	33·8	9·8
Sedgefield.	63	2	30	15	33	53·2	40·1	13·1	61	5	31	4	30	47·4	37·3	10·1	49	27	24	5	25	42·5	35·1	7·4
East Hartlepool.	60	2	38	6, 12, 15, 16	22	50·7	44·3	6·4	58	5, 6	35	11, 13	23	47·4	41·0	6·4	49	23, 25, 27	28	12, 13	21	43·3	38·6	4·7
Darlington.	66	5	26	6	40	51·9	37·0	14·9	64	6	28	4, 18	36	47·2	35·6	11·6	50	1, 7, 27, 28	20	5	30	41·5	33·4	8·1
Gainford.	61	2	29	6, 15	32	52·8	39·7	13·1	61	6	30	4, 29	31	47·3	37·8	9·5	52	23, 27	25	5, 12, 13	27	42·4	34·6	7·8
Average.	60·5	...	30·4	...	30·1	51·8	39·8	12·0	61·1	...	30·3	...	30·8	47·2	37·2	10·0	50·6	...	23·3	...	27·3	42·7	35·0	7·8
Greenwich.	67	2	29	14	38	56·7	41·1	15·6	62	5	32	18	30	50·8	40·8	10·0	55	22	27	12	28	47·0	38·7	8·3

2. Absolute Temperatures.

EXTREME AND MEAN DAILY TEMPERATURES IN THE SEVERAL MONTHS OF 1872.

STATIONS	JANUARY. Mean Temp. of Warmest Day.	Day.	Mean Temp. of Coldest Day.	Day.	Monthly Range of Daily Temps.	Mean Daily Temp.	FEBRUARY. Mean Temp. of Warmest Day.	Day.	Mean Temp. of Coldest Day.	Day.	Monthly Range of Daily Temps.	Mean Daily Temp.	MARCH. Mean Temp. of Warmest Day.	Day.	Mean Temp. of Coldest Day.	Day.	Monthly Range of Daily Temps.	Mean Daily Temp.
North Sunderland	48·5	30	33·0	15, 22	15·5	39·1	48·0	1	36·0	8	12·0	41·1	50·5	5	32·0	21	18·5	42·3
Alnwick	46·5	30	33·0	10	13·5	39·0	47·0	1	35·5	8	11·5	42·5	50·0	17	32·0	21	18·0	42·0
Rothbury	47·5	30	30·5	10	17·0	38·4	46·0	1	33·0	8	13·0	40·0	50·0	4	32·0	21, 22	18·0	41·2
Meldon	48·5	30	31·5	10	17·0	38·3	47·0	29	33·5	8	13·5	41·2	49·5	4, 5	32·0	26	17·5	43·0
Wallington	46·0	30	26·7	10	19·3	36·0	46·7	1	29·4	8	17·3	38·5	47·6	16	32·6	21	15·0	41·1
North Shields (S.)	...	...	...	...	...	40·7	...	...	...	...	...	43·4	...	...	...	...	...	42·3
North Shields (I.)	47·0	30	34·0	8, 10	13·0	39·5	47·5	1	38·5	17	9·0	42·1	49·0	3, 4, 15, 16, 17	32·5	21	16·5	42·8
Wylam	...	...	...	...	...	39·9	...	...	...	...	...	42·5	...	...	...	...	...	43·2
Durham	47·9	31	29·1	21	18·8	38·3	46·8	1	34·9	8	11·9	41·1	51·6	30	31·6	21	20·0	42·3
Seaham Hall	45·0	31	30·5	21	14·5	37·5	47·5	1	35·5	8	12·0	40·2	51·0	30	31·5	21	19·5	42·0
Sedgefield	47·5	30	26·3	21	21·2	38·1	47·4	1	35·9	3	11·5	40·8	52·5	30	31·1	21	21·4	41·9
East Hartlepool	49·0	31	31·0	21	18·0	40·0	48·0	1	38·5	16	9·5	42·4	52·0	30	31·0	21	21·0	43·0
Darlington	47·0	14	25·0	21	22·0	37·1	47·5	1	31·5	16	16·0	40·8	50·0	2, 8	29·5	21, 27	20·5	41·5
Gainford	53·0	30, 31	31·1	15	21·9	38·5	47·0	1	35·0	17	12·0	41·3	49·8	30	31·4	21	18·4	42·3
Average	47·8	...	30·1	...	17·6	38·6	47·2	...	34·8	...	12·4	41·3	50·3	...	31·6	...	18·7	42·2
Greenwich	47·7	13	35·1	15	12·6	41·3	49·9	10	38·3	16	11·6	44·8	52·9	29	30·3	21	22·6	44·6

STATIONS	APRIL. Mean Temp. of Warmest Day.	Day.	Mean Temp. of Coldest Day.	Day.	Monthly Range of Daily Temps.	Mean Daily Temp.	MAY. Mean Temp. of Warmest Day.	Day.	Mean Temp. of Coldest Day.	Day.	Monthly Range of Daily Temps.	Mean Daily Temp.	JUNE. Mean Temp. of Warmest Day.	Day.	Mean Temp. of Coldest Day.	Day.	Monthly Range of Daily Temps.	Mean Daily Temp.	STATIONS.
North Sunderland	53·5	11, 12	40·0	20, 21	13·5	46·2	61·0	26	42·5	11, 19	18·5	49·6	63·0	16, 17	49·5	6	13·5	56·8	North Sunderland.
Alnwick	53·0	12	38·0	19	15·0	45·0	58·0	26	41·0	11	17·0	47·7	63·5	17	49·0	1, 6, 7, 9	14·5	55·6	Alnwick.
Rothbury	52·5	12	37·0	21	15·5	44·3	56·5	1	40·5	18	16·0	47·7	63·5	16	49·5	7	14·0	56·3	Rothbury.
Meldon	55·5	12	37·5	21	18·0	46·4	60·0	2, 26	44·0	11	16·0	50·8	67·5	18	51·0	7	16·5	57·9	Meldon.
Wallington	51·5	11	36·1	21	15·4	43·3	53·2	26	36·8	12	16·4	45·7	64·2	17	49·0	6, 7	15·2	54·9	Wallington.
North Shields (S.)	...	...	...	...	...	45·7	...	...	...	...	...	48·4	...	...	...	...	...	55·8	North Shields (S.).
North Shields (I.)	54·0	12	39·5	19	14·5	46·2	57·0	26, 28, 29	42·5	18, 19	14·5	49·5	64·0	16	51·0	7	13·0	57·1	North Shields (I.).
Wylam	...	...	...	...	...	45·9	...	...	...	...	...	49·5	...	...	...	...	...	57·4	Wylam.
Durham	54·0	8	36·7	2	17·3	45·9	59·2	26	40·3	11	18·9	49·1	70·0	18	47·4	7	22·6	57·5	Durham.
Seaham Hall	54·0	8	39·0	21	15·0	45·2	59·5	25	41·0	19	18·5	48·4	62·0	19	50·0	1	12·0	55·9	Seaham Hall.
Sedgefield	53·3	12	37·8	20	15·5	45·7	58·5	26	39·3	11	19·2	48·7	67·5	18	46·9	7	20·6	57·0	Sedgefield.
East Hartlepool	56·5	12	38·5	19	18·0	45·2	60·5	1	40·5	11	19·5	49·8	66·0	16	50·0	1	16·0	57·8	East Hartlepool.
Darlington	52·0	27	35·5	20, 21	16·5	44·4	60·0	26	41·0	11, 18, 19	19·0	48·5	70·0	18	45·0	6	25·0	58·6	Darlington.
Gainford	53·5	13	35·9	20	17·6	45·8	58·2	26	40·7	11	17·5	49·0	66·9	18	47·5	6	19·4	56·8	Gainford.
Average	53·6	...	37·6	...	16·0	45·4	58·5	...	40·8	...	17·6	48·9	65·7	...	48·8	...	16·9	56·8	Average.
Greenwich	57·6	27	40·4	4	17·2	48·3	62·1	28	41·4	18	20·7	50·9	71·8	17	50·2	7	21·6	59·2	Greenwich.

STATIONS	JULY. Mean Temp. of Warmest Day.	Day.	Mean Temp. of Coldest Day.	Day.	Monthly Range of Daily Temps.	Mean Daily Temp.	AUGUST. Mean Temp. of Warmest Day.	Day.	Mean Temp. of Coldest Day.	Day.	Monthly Range of Daily Temps.	Mean Daily Temp.	SEPTEMBER. Mean Temp. of Warmest Day.	Day.	Mean Temp. of Coldest Day.	Day.	Monthly Range of Daily Temps.	Mean Daily Temp.
North Sunderland	70·0	21	52·5	18	17·5	60·3	64·5	17	51·0	31	13·5	58·1	63·5	13	43·0	21	20·5	53·6
Alnwick	67·0	5	52·0	18	15·0	59·4	64·5	17	51·0	4	13·5	56·5	64·0	13	43·0	22	21·0	53·0
Rothbury	69·0	5	52·5	14	16·5	60·1	66·5	18	48·5	5	18·0	57·3	61·5	13	42·0	21, 22	19·5	51·7
Meldon	71·5	5	56·0	10, 18	15·5	63·0	69·0	22	52·0	5	17·0	60·0	66·0	13	41·5	25	24·5	52·7
Wallington	66·7	5	49·0	18	17·7	58·3	63·1	17	44·6	28	18·5	56·0	61·0	4	40·5	21	20·5	50·4
North Shields (S.)	...	...	...	...	...	60·0	...	...	...	...	...	56·9	...	...	...	...	...	53·3
North Shields (I.)	70·0	22	54·0	17	16·0	61·0	64·0	17	54·0	4	10·0	58·2	66·0	13	44·0	22	22·0	54·3
South Shields	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Wylam	...	...	...	...	...	62·2	...	...	...	...	...	58·6	...	...	...	...	...	54·0
Durham	71·3	22	54·0	14	17·3	62·4	65·7	18	53·4	5	12·3	58·8	65·8	13	42·5	24	23·3	53·5
Seaham Hall	69·0	27	54·0	14	15·0	59·9	63·5	29	52·0	4	11·5	56·1	62·5	11, 12	41·0	24	21·5	53·6
Sedgefield	71·3	22	51·1	17	20·2	63·0	63·5	17	52·6	4	10·9	57·8	67·5	13	42·4	24	25·1	54·2
East Hartlepool	69·5	22	54·0	8	15·5	61·5	67·0	17	53·5	3	13·5	58·6	67·0	13	43·0	22	24·0	54·7
Darlington	72·5	5, 21, 27	55·0	14	17·5	64·5	68·5	18	51·5	5	17·0	60·4	70·5	12	41·5	24	29·0	54·8
Gainford	70·2	27	54·7	18	15·5	62·2	65·5	17	51·0	4	14·5	59·1	67·0	13	41·9	26	25·1	53·7
Average	69·8	...	53·2	...	16·6	61·3	65·4	...	51·3	...	14·2	58·0	65·2	...	42·2	...	23·0	53·4
Greenwich	75·4	25	55·9	15	19·5	65·0	67·3	25	54·6	4	12·7	60·9	69·5	3	44·6	22, 24	24·9	57·4

STATIONS	OCTOBER. Mean Temp. of Warmest Day.	Day.	Mean Temp. of Coldest Day.	Day.	Monthly Range of Daily Temps.	Mean Daily Temp.	NOVEMBER. Mean Temp. of Warmest Day.	Day.	Mean Temp. of Coldest Day.	Day.	Monthly Range of Daily Temps.	Mean Daily Temp.	DECEMBER. Mean Temp. of Warmest Day.	Day.	Mean Temp. of Coldest Day.	Day.	Monthly Range of Daily Temps.	Mean Daily Temp.	STATIONS.
North Sunderland	55·0	2	40·5	15	14·5	46·7	54·5	6	37·0	19	17·5	43·1	47·0	28	29·5	5	17·5	39·5	North Sunderland.
Alnwick	55·5	2	39·0	15	16·5	46·1	54·5	6	36·5	19	18·0	42·9	48·5	24	30·0	12	18·5	39·5	Alnwick.
Rothbury	54·5	2	39·0	15	15·5	44·9	52·5	6	33·5	19	19·0	40·4	46·0	28	29·5	13	16·5	37·1	Rothbury.
Meldon	55·5	2	36·5	15	19·0	44·8	52·0	5	31·0	10	21·0	40·0	46·5	28	25·5	12	21·0	36·9	Meldon.
Wallington	52·0	2	37·7	5	14·3	43·4	50·7	6	32·0	19	18·7	38·9	46·3	23	24·9	12	21·4	36·1	Wallington.
North Shields (S.)	...	...	...	...	...	46·6	...	...	...	...	...	44·7	...	...	...	...	...	40·9	North Shields (S.).
North Shields (I.)	55·5	2	39·0	15	16·5	46·8	54·5	6	37·5	19	17·0	43·5	48·0	28	31·5	12	16·5	40·9	North Shields (I.).
South Shields	55·5	2	40·5	15	15·0	47·2	53·5	6	37·3	19	16·2	43·7	47·8	28	30·5	12	17·3	40·8	South Shields.
Wylam	...	...	...	...	...	47·3	...	...	...	...	...	43·2	...	...	...	...	...	39·8	Wylam.
Durham	55·2	2	38·8	15	16·4	46·0	52·9	6	34·4	13	18·5	41·6	45·8	23, 28	28·9	12	16·9	38·6	Durham.
Seaham Hall	55·0	2, 3	37·5	20	17·5	44·8	54·0	6	35·0	19	19·0	42·0	46·5	24, 25	28·5	12	18·0	38·7	Seaham Hall.
Sedgefield	55·2	2	41·0	15	14·2	46·4	54·7	6	34·7	13	20·0	42·5	45·7	25, 27, 28	28·2	5	17·5	38·9	Sedgefield.
East Hartlepool	57·0	2	42·0	15	15·0	47·5	53·5	6	37·0	12	16·5	44·2	47·5	24, 25, 28	29·5	12	18·0	41·0	East Hartlepool.
Darlington	...	...	...	...	...	...	54·5	6	34·0	18	20·5	41·6	47·0	28	27·5	5, 13	19·5	37·5	Darlington.
Gainford	57·0	2	40·7	10	16·3	46·3	54·5	6	35·1	13	19·4	42·6	47·7	23	28·3	12	19·4	38·5	Gainford.
Average	55·2	...	39·4	...	15·9	46·1	53·6	...	35·0	...	18·6	42·3	46·9	...	28·6	...	18·3	39·0	Average.
Greenwich	58·5	2	39·6	15	18·9	47·8	55·8	6	36·0	17	19·8	45·3	51·2	22	31·3	12	19·9	42·9	Greenwich.

MEAN AMOUNT OF HUMIDITY IN THE SEVERAL MONTHS OF 1872.

STATIONS.	JANUARY.			FEBRUARY.			MARCH.			APRIL.			MAY.			JUNE.			STATIONS.
	Mean Temp. Dry Bulb.	Mean Temp. Wet Bulb.	Mean Relative Humidity.	Mean Temp. Dry Bulb.	Mean Temp. Wet Bulb.	Mean Relative Humidity.	Mean Temp. Dry Bulb.	Mean Temp. Wet Bulb.	Mean Relative Humidity.	Mean Temp. Dry Bulb.	Mean Temp. Wet Bulb.	Mean Relative Humidity.	Mean Temp. Dry Bulb.	Mean Temp. Wet Bulb.	Mean Relative Humidity.	Mean Temp. Dry Bulb.	Mean Temp. Wet Bulb.	Mean Relative Humidity.	
North Sunderland (9 A.M.)	39·3	38·4	93	41·7	40·9	94	43·9	42·3	87	48·6	46·7	87	51·5	49·6	87	59·9	58·3	90	North Sunderland (9 A.M.).
Rothbury (9 A.M.)	38·6	38·0	95	39·3	38·6	94	40·8	40·0	94	44·8	43·1	87	49·3	47·8	90	58·6	55·4	80	Rothbury (9 A.M.).
North Shields (S.)	...	...	87	...	...	91	...	...	87	...	...	88	...	...	77	...	...	79	North Shields (S.).
North Shields (I., 8 A.M.)	39·3	38·3	92	41·6	40·8	94	41·7	40·3	90	45·8	43·3	82	49·8	46·5	79	57 7	53·5	75	North Shields (I., 8 A.M.).
Wylam (8 A.M.)	38·9	37·1	86	41·3	39·4	85	40·7	39·9	94	44·9	42·3	80	49·5	45·9	76	57·8	54·0	77	Wylam (8 A.M.).
Bywell	...	...	80	...	...	89	...	...	80	...	...	77	...	...	75	...	...	78	Bywell.
Allenheads	...	...	94	...	...	93	...	...	91	...	...	86	...	...	85	...	...	82	Allenheads.
Durham (10 A.M. and 10 P.M.).	38·9	37·5	89	41·3	39·9	89	41·6	40·0	88	44·8	42·0	79	47·0	44·7	84	55·6	52·1	78	Durham (10 A.M. and 10 P.M.).
Sedgefield (9 A.M.)	37·6	36·6	92	40·2	39·2	92	41·2	39·3	.85	45·8	43·0	80	49·3	46·2	79	58·2	53·6	73	Sedgefield (9 A.M.).
East Hartlepool (9 A.M.)	40·1	38·6	88	42·5	41·0	88	42·4	40·4	85	45·9	43·3	82	49·8	45·9	74	57·3	53·4	76	East Hartlepool (9 A.M.).
Gainford (9 A.M.)	...	...	...	41·2	39·9	90	...	...	...	47·9	45·1	80	52·1	48·3	75	60·1	55·5	73	Gainford (9 A.M.).
Average	39·0	37·8	90	41·1	40·0	91	41·8	40·3	88	46·1	43·6	83	49·8	46·9	80	58·2	54·5	78	Average.
Greenwich	...	...	89	...	...	86	...	...	84	...	...	76	...	...	76	...	...	75	Greenwich.

	JULY.			AUGUST.			SEPTEMBER.			OCTOBER.			NOVEMBER.			DECEMBER.			
North Sunderland (9 A.M.)	62·0	60·8	93	59·6	58·4	93	54·2	53·4	95	47·7	46·8	94	44·1	42·9	91	40·5	39·6	93	North Sunderland (9 A.M.).
Rothbury (9 A.M.)	61·6	59·2	86	56·6	55·7	94	52·5	51·2	81	45·5	44·2	91	41·5	40·9	95	37·8	37·3	96	Rothbury (9 A.M.).
North Shields (S.)	...	...	76	...	...	83	...	...	80	...	...	87	...	...	85	...	...	82	North Shields (S.).
North Shields (I., 8 A.M.)	60·1	57·0	82	57·4	55·2	86	53·6	51·2	84	46·2	44·6	89	43·3	41·4	85	40·7	39·6	91	North Shields (I., 8 A.M.).
South Shields (10 A.M.)	...	...	...	...	...	...	...	...	...	52·8	49·5	78	49·6	46·4	79	46·3	43·4	80	South Shields (10 A.M.).
Wylam (8 A.M.)	61·9	58·3	79	57·2	54·6	84	53·2	50·4	81	45·0	43·0	85	42·6	40·1	82	39·1	37·7	89	Wylam (8 A.M.).
Bywell	...	...	69	...	...	77	...	...	79	...	...	79	...	...	77	...	...	80	Bywell.
Allenheads	...	...	85	...	...	86	...	...	98	...	...	95	...	...	94	...	...	94	Allenheads.
Durham (10 A.M. and 10 P.M.).	60·3	57·2	82	57·1	54·1	81	53·0	50·2	81	46·3	43·6	81	42·5	41·0	88	39·5	38·2	90	Durham (10 A.M. and 10 P.M.).
Sedgefield (9 A.M.)	62·6	58·3	79	58·1	55·3	82	54·7	51·4	79	45·7	43·8	86	42·3	40·7	88	38·3	37·4	93	Sedgefield (9 A.M.).
East Hartlepool (9 A.M.)	60·1	57·1	82	57·6	55·1	84	54·1	51·5	83	46·8	44·9	87	44·4	42·2	83	41·2	39·4	86	East Hartlepool (9 A.M.).
Gainford (9 A.M.)	64·8	60·1	74	60·0	57·2	83	56·0	52·8	80	46·4	44·7	88	43·7	42·0	86	40·0	38·9	91	Gainford (9 A.M.).
Average	61·7	58·5	81	58·0	55·7	85	53·8	51·5	85	47·2	45·0	87	43·8	41·9	86	40·4	39·1	89	Average.
Greenwich	...	...	78	...	...	75	...	...	79	...	...	91	...	...	87	...	...	88	Greenwich.

MEAN AMOUNT OF CLOUD IN THE SEVERAL MONTHS OF 1872.

STATIONS.	January.	February.	March.	April.	May.	June.	STATIONS.
North Shields (S.)	7·4	7·7	6·0	6·4	6·7	7·3	North Shields (S).
Bywell	6·1	6·5	5·7	5·3	4·8	4·5	Bywell.
Allenheads	8·0	7·9	6·6	6·5	6·9	7·9	Allenheads.
Durham	7·3	8·5	6·7	6·4	6·4	7·5	Durham.
Sedgefield	7·1	8·0	6·4	7·1	7·4	6·8	Sedgefield.
Average	7·2	7·7	6·3	6·3	6·4	6·8	Average.
Greenwich	6·9	7·2	6·5	5·6	6·9	6·5	Greenwich.

STATIONS.	July.	August.	September.	October.	November.	December.	STATIONS.
North Shields (S.)	5·6	6·3	5·6	5·7	7·2	8·3	North Shields (S.).
Bywell	4·0	5·2	4·8	5·8	5·9	7·3	Bywell.
Allenheads	5·8	6·7	7·0	6·8	6·3	7·5	Allenheads.
Durham	6·7	6·9	6·2	6·3	6·8	7·8	Durham.
Sedgefield	6·4	7·2	6·7	7·8	7·1	8·3	Sedgefield.
Average	5·7	6·5	6·1	6·5	6·7	7·8	Average.
Greenwich	6·1	6·2	6·4	6·8	7·1	7·1	Greenwich.

4. Humidity, Cloud.

EXTREMES AND RANGE OF PRESSURE AND MEAN PRESSURE, IN THE SEVERAL MONTHS OF 1872.

STATIONS.	Height in Feet above Level of Sea.	JANUARY.						FEBRUARY.						MARCH.					
		Greatest Pressure.	Day.	Least Pressure.	Day.	Monthly Range.	Mean Daily Pressure.	Greatest Pressure.	Day.	Least Pressure.	Day.	Monthly Range.	Mean Daily Pressure.	Greatest Pressure.	Day.	Least Pressure.	Day.	Monthly Range	Mean Daily Pressure.
North Sunderland	69	29·80	12	28·18	18	1·62	29·24	29·96	27	29·11	1	0·85	29·52	30·05	10	29·01	28, 30	1·04	29·56
Alnwick	...	29·79	10, 12	28·12	18	1·67	29·15	29·97	27	29·05	1	0·92	29·46	30·05	10	28·91	30	1·14	29·49
Cresswell	96	30·10	10, 12	28·43	18	1·67	29·49	30·23	27	29·40	1	0·83	29·78	30·35	10	29·20	28	1·15	29·82
Wallington	398·5	29·62	12	28·12	18	1·50	29·06	29·73	27	28·98	1	0·75	29·30	29·82	10	28·83	29, 30	0·99	29·34
Cullercoats	...	...	...	...	...	...	...	30·00	27	29·21	1	0·79	...	30·12	10	29·06	30	1·06	...
North Shields (S.)	124	29·95	12	28·37	18	1·58	29·46	30·13	27	29·29	29	0·84	29·73	30·21	10	29·04	28	1·17	29·78
North Shields (I)	...	30·00	12	28·42	18	1·58	29·41	30·16	27	29·36	1	0·80	29·70	30·24	10	29·15	28, 30	1·09	29·71
Wylam (*t. h.*)	96	30·05	10	28·40	24	1·65	29·44	30·20	27	29·27	1	0·93	29·72	30·30	10	29·19	28	1·11	29·74
Bywell (*t. d.*)	86·5	29·99	12	28·41	24	1·58	29·34	30·14	27	29·30	1	0·84	29·60	30·23	10	29·12	28	1·11	29·61
Allenheads (*t. d.*)	1360	28·56	12	27·14	24	1·42	28·05	28·70	27	27·94	1	0·76	28·42	28·71	4	27·72	28	0·99	28·24
Durham (*t. d.*)	352·4	29·65	10	27·98	24	1·67	29·07	29·81	27	29·00	1	0·81	29·33	29·89	10	28·67	28	1·22	29·34
Seaham Hall	80	29·88	10, 27	28·37	18	1·51	29·32	30·11	27	29·31	29	0·80	29·63	30·17	10	29·13	29, 30	1·04	29·65
Sedgefield (*t.*)	360	29·65	12	27·96	24	1·69	29·07	29·78	27	28·95	25	0·83	29·32	29·89	10	28·82	28	1·07	29·36
East Hartlepool (*t.*)	...	29·83	10	28·31	24	1·52	29·28	29·95	27	29·24	25	0·71	29·55	30·05	10	28·97	30	1·08	29·55
Gainford (*t. h.*)	250	29·88	12	28·34	24	1·54	29·23	30·03	27	29·27	1	0·76	29·60	30·14	10	29·07	30	1·07	29·63
Average	...	29·74	...	28·15	...	1·58	29·16	29·90	...	29·09	...	0·81	29·45	29·98	...	28·89	...	1·09	29·45
Greenwich (*t. d.*)	159	30·01	12	28·48	24	1·53	29·46	30·04	27	29·33	25	0·71	29·65	30·15	10	29·10	30	1·05	29·63

STATIONS.	APRIL.						MAY.						JUNE.						Height in Feet above Level of Sea.	STATIONS.
	Greatest Pressure.	Day.	Least Pressure.	Day.	Monthly Range.	Mean Daily Pressure.	Greatest Pressure.	Day.	Least Pressure.	Day.	Monthly Range.	Mean Daily Pressure.	Greatest Pressure.	Day,	Least Pressure.	Day.	Monthly Range.	Mean Daily Pressure.		
North Sunderland	30·24	6	29·18	22	1·06	29·69	30·11	1	29·01	4	1·10	29·68	30·06	16	29·11	10	0·95	29·64	69	North Sunderland.
Alnwick	30·22	6	29·02	22, 23	1·20	29·62	30·05	1, 10 26, 27	28·78	4	1·27	29·59	30·00	16	28·98	10	1·02	29·53	...	Alnwick.
Cresswell	30·50	6	29·40	22, 23	1·10	29·95	30·40	1	29·30	4, 8	1·10	29·94	30·33	16	29·35	10	0·98	29·91	96	Cresswell.
Wallington	29·98	6	28·93	22	1·05	29·46	29·90	1	28·83	4	1·07	29·45	29·84	16	28·90	10	0·94	29·42	398·5	Wallington.
Cullercoats	30·30	6	29·14	22	1·16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Cullercoats.
North Shields (S.)	30·40	6	29·19	22	1·21	29·89	30·25	1	29·05	4	1·20	29·88	30·16	16	29·25	9	0·91	29·84	124	North Shields (S.).
North Shields (I)	30·42	6	29·23	22	1·19	29·83	30·29	1	29·19	7	1·10	29·83	30·23	16	29·23	10	1·00	29·79	...	North Shields (I.).
Wylam (*t. h.*)	30·53	6	29·28	22	1·25	29·90	30·31	26	29·20	4	1·11	29·87	30·25	16	29·23	10	1·02	29·81	96	Wylam (*t. h.*).
Bywell (*t. d.*)	30·34	6	29·16	22	1·18	29·73	30·20	26	29·04	7	1·16	29·73	30·12	16	29·15	9	0·97	29·68	86·5	Bywell (*t. d.*).
Allenheads (*t. d.*)	28·93	6	27·80	22	1·13	28·38	28·83	27	27·66	4	1·17	28·39	28·73	17	27·83	10	0·90	28·33	1360	Allenheads (*t. d.*).
Durham (*t. d.*)	30·08	5	28·87	22	1·21	29·49	29·92	10	28·75	4	1·17	29·47	29·88	16	28·83	9	1·05	29·42	352·4	Durham (*t. d.*).
Seaham Hall	30·38	6	29·26	22, 23 24	1·12	29·81	30·33	1	29·22	7, 8	1·11	29·80	30·22	16	29·36	9	0·86	29·72	80	Seaham Hall.
Sedgefield (*t.*)	30·07	6	28·77	22	1·30	29·48	29·93	1	28·81	4	1·12	29·47	29·87	16	28·89	10	0·98	29·43	360	Sedgefield(*t.*).
East Hartlepool (*t.*)	30·23	6	29·02	22	1·21	29·66	30·13	1	29·06	4	1·07	29·68	30·02	16	29·07	10	0·95	29·63	...	East Hartlepool (*t.*).
Gainford (*t. h.*)	30·30	6	29·14	22	1·16	29·74	30·15	1, 26 27	29·11	7	1·04	29·73	30·11	16	29·14	10	0·97	29·68	250	Gainford (*t. h.*).
Average	30·16	...	29·00	...	1·16	29·58	30·03	...	28·89	...	1·14	29·58	29·96	...	29·00	...	0·96	29·53	...	Average.
Greenwich (*t. d.*)	30·31	7	28·95	21	1·36	29·74	30·22	1	29·22	7	1·00	29·74	30·12	16	29·28	9	0·84	29·74	159	Greenwich (*t.d.*).

STATIONS.	Height in Feet above Level of Sea.	JULY.						AUGUST.						SEPTEMBER.					
		Greatest Pressure.	Day.	Least Pressure.	Day.	Monthly Range.	Mean Daily Pressure.	Greatest Pressure.	Day.	Least Pressure.	Day.	Monthly Range.	Mean Daily Pressure.	Greatest Pressure.	Day.	Least Pressure.	Day.	Monthly Range	Mean Daily Pressure.
North Sunderland	69	29·96	4	29·51	1, 8	0·45	29·76	30·15	20	29·29	11	0·86	29·79	29·96	14	28·93	28	1·03	29·52
Alnwick	...	29·88	3, 4	29·37	1	0·51	29·65	30·06	19	29·15	11	0·91	29·69	29·90	14	28·85	28	1·05	29·42
Cresswell	96	30·25	4, 5	29·80	1, 9	0·45	30·02	30·40	14, 15 19	29·50	11	0·90	30·06	30·20	13, 14	29·30	28	0·90	29·79
Wallington	398·5	29·74	4	29·30	1	0·44	29·52	29·88	19	29·13	11	0·75	29·55	29·74	14	28·90	28	0·84	29·32
North Shields (S.)	124	30·09	4	29·61	1	0·48	29·93	30·24	21	29·34	10	0·90	29·98	30·05	14	29·10	28	0·95	29·72
North Shields (I.)	...	30·13	4	29·65	1	0·48	29·90	30·30	19	29·46	11	0·84	29·95	30·15	18, 14	29·20	25, 28	0·95	29·70
South Shields (*t.*)	38	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Wylam (*t. h.*)	96	30·14	8	29·69	8	0·45	29·91	30·30	19	29·37	11	0·93	29·93	30·15	13	29·05	29	1·10	29·70
Bywell (*t. d.*)	87	30·02	4	29·51	8	0·51	29·79	30·19	19	29·42	11	0·77	29·84	30·03	14	29·02	28	1·01	29·56
Allenheads (*t. d.*)	1360	28·74	4	28·22	8	0·52	28·46	28·22	19	28·01	10	0·81	28·49	28·71	13	27·76	28	0·95	28·23
Durham (*t. d.*)	352·4	29·81	4	29·30	8	0·51	29·53	29·91	19	29·00	10	0·91	29·56	29·77	13	28·85	28	0·92	29·31
Seaham Hall	80	30·11	3, 4, 5	29·33	12	0·78	29·80	30·29	19	29·33	11	0·96	29·88	30·05	14	29·22	28	0·83	29·62
Sedgefield (*t.*)	360	29·77	4	29·30	1	0·47	29·52	29·91	19	29·10	11	0·81	29·56	29·75	14	28·86	25	0·89	29·32
East Hartlepool (*t.*)	...	29·93	4	29·49	1	0·44	29·70	30·09	19	29·28	11	0·81	29·76	29·92	13, 14	29·06	25	0·86	29·53
Gainford (*t. h.*)	250	30·00	4	29·55	1	0·45	29·77	30·14	19	29·34	11	0·80	29·83	30·02	13	29·16	28	0·86	29·59
Average	...	29·87	...	29·37	...	0·50	29·63	30·02	...	29·17	...	0·85	29·68	29·85	...	28·92	...	0·93	29·42
Greenwich (*t. d.*)	159	30·08	4	29·50	30	0·58	29·76	30·14	28	29·30	7	0·84	29·80	30·15	13	29·20	24	0·95	29·68

STATIONS.	OCTOBER.						NOVEMBER.						DECEMBER.						Height in Feet above Level of Sea.	STATIONS.
	Greatest Pressure.	Day.	Least Pressure.	Day.	Monthly Range.	Mean Daily Pressure.	Greatest Pressure.	Day.	Least Pressure.	Day.	Monthly Range.	Mean Daily Pressure.	Greatest Pressure.	Day.	Least Pressure.	Day.	Monthly Range.	Mean Daily Pressure.		
North Sunderland	30·10	5	29·01	11	1·09	29·43	30·15	13	28·69	26	1·46	29·35	29·68	22	28·41	9	1·27	29·29	69	North Sunderland.
Alnwick	30·10	5	28·88	24	1·22	29·34	30·15	13	28·52	23	1·63	29·29	29·66	12	28·42	9	1·24	29·22	...	Alnwick.
Cresswell	30·40	5, 6	29·20	11	1·20	29·69	30·38	13	28·95	23, 26	1·43	29·62	30·00	5	28·60	9	1·40	29·59	96	Cresswell.
Wallington	29·86	5	28·83	25	1·03	29·22	29·87	13	28·55	23	1·32	29·17	29·48	12	28·40	9	1·08	29·08	398·5	Wallington.
North Shields (S.)	30·26	5	29·07	10	1·19	29·63	30·20	13	28·72	23	1·50	29·56	29·83	12	28·34	8	1·49	29·51	124	North Shields (S.).
North Shields (I.)	30·27	5	29·17	11	1·10	29·59	30·29	13	28·89	26	1·40	29·54	29·88	12, 22	28·51	9	1·37	29·47	...	North Shields (I.).
South Shields (*t.*)	30·29	5	29·18	24	1·11	29·59	30·28	13	28·84	23	1·44	29·55	29·89	12	28·71	9	1·18	29·48	38	South Shields (*t.*).
Wylam (*t. h.*)	30·36	5	29·12	2	1·24	29·62	30·30	13	28·83	26	1·47	29·57	29·95	12	28·67	9	1·28	29·49	96	Wylam (*t. h.*).
Bywell (*t. d.*)	30·21	5	29·05	24	1·16	29·50	30·20	13	28·68	23	1·52	29·44	29·82	12	28·60	9	1·22	29·38	87	Bywell (*t. d.*).
Allenheads (*t. d.*)	28·81	5	27·69	24	1·12	28·13	28·78	13	27·36	23	1·42	28·10	28·40	12	27·32	9	1·08	28·04	1360	Allenheads (*t. d.*).
Durham (*t. d.*)	29·93	5	28·66	10	1·27	29·22	29·91	12	28·37	23	1·54	29·17	29·55	4	28·16	8	1·39	29·11	352·4	Durham (*t. d.*).
Seaham Hall	30·17	5	29·96	11	1·08	29·52	30·19	13	28·73	30	1·46	29·49	29·77	22	28·29	11	1·48	29·36	80	Seaham Hall.
Sedgefield (*t.*)	29·91	5	28·82	11, 24	1·09	29·24	29·87	13	28·54	23, 30	1·33	29·18	29·58	12	28·27	9	1·31	29·08	360	Sedgefield (*t.*).
East Hartlepool (*t.*)	30·07	5, 6	28·96	11	1·11	29·43	30·05	13	28·74	26	1·31	29·39	29·77	26	28·36	9	1·41	29·31	...	East Hartlepool (*t.*).
Gainford (*t. h.*)	30·18	6	29·09	25	1·09	29·52	30·16	13	28·83	26	1·33	29·47	29·84	12	28·52	9	1·32	29·38	250	Gainford (*t. h.*).
Average	30·03	...	28·89	...	1·14	29·35	30·02	...	28·58	...	1·44	29·30	29·64	...	28·34	...	1·30	29·22	...	Average.
Greenwich (*t. d.*)	30·20	6	29·04	24	1·16	29·53	30·21	7	28·70	30	1·51	29·51	29 84	12	28·69	10	1·15	29·41	159	Greenwich (*t. d.*).

NOTE.—In this Table, *t.* signifies corrected for temperature, *d.* for diurnal range, *h.* for height above sea level. In calculating the average, for purposes of comparison, those stations have been omitted which have introduced the correction *h.*

, WANSBECK, AND ALN DISTRICTS.

Brinkburn Priory.		Meldon Park, Morpeth.		Wallington.		Lilburn. Tower.	Glanton Pike.	Millfield, near Wooler.	Belford, Middleton Hall.
300 feet.		333 feet.		398 ft. 6 in.		300 feet.	530 feet.	200 feet.	240 feet.
1 foot.		1 foot.		1 foot		6 feet.	4 inches.	4 inches.	2 feet.
antity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Quantity.	Quantity.	Quantity.
nches.		Inches.		Inches.		Inches.	Inches.	Inches.	Inches.
3·00	16	2·70	20	3·32	21	Monthly returns not given.	2·86	2·95	3·97
3·52	18	3·28	23	3·53	23		3·23	2·96	1·43
4·02	18	4·23	20	4·15	21		3·28	3·13	1·29
3·27	12	3·07	16	3·95	15		4·02	4·13	3·31
2·17	18	2·21	21	1·88	22		3·15	3·49	3·69
2·54	17	2·40	19	2·56	19		1·84	1·99	2·25
3·43	15	4·00	15	4·36	16		4·33	3·34	3·85
3·63	15	3·92	15	3·83	19		4·05	3·18	3·83
3·61	21	4·62	23	5·69	23		6·37	7·23	4·44
6·19	17	5·65	21	5·99	20		6·72	5·46	7·09
4·38	19	4·79	23	5·35	22		4·74	5·59	4·62
6·16	20	6·91	22	6·10	22		6·18	4·77	3·71
48·92	206	46·88	238	50·71	234	46·59	50·77	43·22	43·48
31·22	134	28·49	...	32·19	209	25·44	30·17	29 13	25·98
29·36	...	......	...	28·81	203	23·27	25·38	23·84	19·20
25·24	...	......	...	29·25	193	23·97	25·14	23·34	23·20
26·69	...	......	...	31·47	209	27·42	30·15	27·51	29·20
33·68	...	......	...	28·99	198	26·61	27·82	24·45	24·10
33·87	...	......	...	......	...	30·02	35·06	32·18	26·89
32·45	...	......	...	......	...	30·39	34·26	28·65	28·92
26·54	...	......	...	......	...	31·97	28·69	......	30·10
......	...	......	...	......	...	25·86	30·09	......	......
......	...	......	...	......	...	30·04	27·12	......	......
......	...	......	...	......	...	26·17	27·10	......	......
......	...	......	...	......	...	......	......	......	......
......	...	......	...	......	...	25·98	......	......	......
......	...	......	...	......	...	24·27	......	......	......
......	...	......	...	......	...	27·11	......	......	......
......	...	......	...	......	...	32·90	......	......	......
31·99 9 yrs.	170 2 yrs.	37·68 2 yrs.	...	33·57 6 yrs.	207 6 yrs.	28·62 16 yrs.	29·31 12 yrs.	29·04 8 yrs.	27·89 9 yrs.
+16·93 Inches.	+36 Days	+9·20 Inches.	...	+17·14 Inches.	+27 Days	+17·97 Inches.	+21·46 Inches.	+14·18 Inches.	+15·59 Inches.

Newcastle, Lit. and Phil. Institution.		Wallsend.	North Shields, Rosella Place.		North Shields, Clementhorpe.		North Shields, Low Lights.		Tynemouth Pier Works.		South Shields, Marine School.
105 feet.		100 feet.	125 feet.		150 feet.		22 feet.		61 ft. 2 in.		40 feet.
7. inches.		10 inches.	1 foot.		1 foot.		3 ft. 4 in.		1 ft. 10 in.		7 inches.
	Days			Days		Days		Days		Days	

APPEARANCE AND PREVALENCE C

	I SUNDERLAND.	BYRNESS.	ROTHBURY.		CRESSWELL.		MEI	
.	Prev.	App.	App.	Prev.	App.	Prev.	App.	
4	......	......	April 4	Very few ...	May 1	Abundant ...	Mar. 16	A
	......	......	......	......	July 3	Scarce.........	......	
	......	......	......	......	April 20	Abundant ...	......	
	......	......	June 8	Scarce.........	June 16	Scarce.........	......	
27	Very scarce...	......	......	......	......	......	......	
	......	Mar. 4	Aug. 24	Scarce.........	July 23	Scarce.........	......	
8	Very scarce...	......	......	......	May 1	Scarce.........	Mar. 5	Sc
	......	......	......	......	......	......	......	
	......	......	......	......	......	......	......	
	......	......	......	......	......	......	......	
	......	......	......	......	......	......	......	
	......	......	......	......	......	......	......	
	......	Mar. 5	......	......	Mar. 4	......	Jan. —	{
18	Scarce.........	April 8	......	......	April 7	Abundant ...	Mar. 6	A
28	Abundant ...	April 29	April 26	Very numerous	April 10	Abundant ...	April 12	N

SEAHAM HALL.			DARLINGTON.	GAINFORD.
Arr.	Dep.	Prev.	Arr.	Arr.
May 10	......	Average......	......	......
April 8	......	......	......	......
May 10	......	Rare	......	......
May 8	......	......	......	......
Oct. 9	April 29	......	......	......
April 14	......	......	......	......
May 14	......	Rare	......	......
Oct. —	......	Rare	......	......
Nov. —	......	Rare	......	......
June 5	......	Rare	......	March 16
April 24	......	......	April 15	April 27
May —	......	......	......	......
April 15	......	......	......	April 27
......	......	Rare	......	......
......	......	......	......	......

Dipper
Commc
Tawney
Long-e
Long-t
Missel
Redbre
Hedge
Great T
Golden
Water
Green
Grey W
Golden
Starlin
Carrion
Red G
Curlew
Sparro
Woodc

RAINFALL FOR 1872.

TEES DISTRICT.

Place.	Dinsdale, near Darlington	Darlington (Southend).		Darlington (Brinkburn).		Hartlepool, Heugh Lighthouse.		Greta Bridge.		Egglescliffe, Yarm		Sedgefield, Durham County Asylum.		Gainford.	
Height of Guage—Above Sea Level	50 feet.	140 feet.		160 feet.		36 feet.		431 feet.		80 feet.		360 feet.		251 8 feet	
Height of Guage—Above Ground...	1 ft. 6 in.	10 inches.		1 foot.		5 inches.		5 inches		1 foot.		10 inches.		1 foot	
Month.	Quantity.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.
	Inches.	Inches.		Inches.		Inches.		Inches.		Inches.		Inches.		Inches.	
January	No returns furnished.	Monthly returns not furnished.	...	2·30	11	2·10	21	4·43	18	Monthly returns not furnished.	...	Monthly returns not furnished.	...	3·10	20
February			...	2·35	13	2·41	21	3·16	24		...		...	2·74	25
March			...	3·00	11	3·87	22	4·16	12		...		...	4·41	20
April			...	2·40	13	2·27	15	2·84	10		...		...	2·29	15
May			...	1·40	10	2·22	18	1·41	11		...		...	1·00	12
June			...	3·00	11	3·03	17	3·49	15		...		...	2·97	20
July			...	4·35	11	3·35	15	4·05	11		...		...	5·15	15
August			...	4·85	12	2·57	16	3·02	15		...		...	3·90	16
September			...	2·80	10	5·64	25	3·82	15		...		...	3·32	20
October			...	3·95	10	4·07	22	4·73	16		...		...	4·16	22
November			...	3·80	14	4·02	19	5·22	20		...		...	4·41	22
December			...	2·90	12	4·06	22	4·42	12		...		...	3·34	23
Total for 1872	......	36·50	128	37·10	138	39·61	233	44·75	179	39·54	235	39·34	245	40·79	230
" 1871	......	21·10	...	23·47	91	30·69	193	29·19	124	27·34	164	28·40	162	25·97	170
" 1870	26·39	21·15	125	19·65	83	23·78	174	25·69	90	20·89	153	23·39	151	21·62	142
" 1869	26·32	24·03	...	25·75	102	24·50	...	30·98	129	23·74	186	28·88	194	26·75	...
" 1868	24·96	37·25	...	21·75	97	......	...	28·89	...	20·38	167	26·93	206	......	...
" 1867	26·66	40·79	...	......	...	......	...	22·24	...	23·23	175	25·56	238	......	...
" 1866	29·95	38·71	...	......	...	......	...	29·42	...	26·27	...	30·27	...	......	...
" 1865	22·50	27·05	...	......	...	......	...	26·73	...	......	...	25·57	...	......	...
" 1864	......	22·11	...	......	...	......	...	24·26	...	......	...	......	...	......	...
" 1863	......	19·26	...	......	...	......	...	26·25	...	......	...	......	...	......	...
" 1862	......	21·24	...	......	...	......	...	25·84	...	......	...	......	...	......	...
" 1861	......	32·83	...	......	...	......	...	24·54	...	......	...	......	...	......	...
" 1860	......	31·86	...	......	...	......	...	30·28	...	......	...	......	...	......	...
" 1859	......	27·65	...	......	...	......	...	26·74	...	......	...	......	...	......	...
" 1858	......	......	...	......	...	......	...	21·56	...	......	...	......	...	......	...
" 1857	......	......	...	......	...	......	...	23·93	...	......	...	......	...	......	...
" 1856	......	......	...	......	...	......	...	27·30	...	......	...	......	...	......	...
Average of Years	26·13 6 yrs.	28·68 14 yrs.	...	25·54 5 yrs.	102 5 yrs.	29·64 4 yrs.	200 3 yrs.	27·56 17 yrs.	130 4 yrs.	25·90 7 yrs.	180 6 yrs.	28·54 8 yrs.	199 6 yrs.	29·03 4 yrs.	181 3 yrs.
Difference in 1872 from Mean	......	+5·82 Inches.	...	+11·56 Inches.	+36 Days	+9·97 Inches.	+33 Days	+17·19 Inches.	+49 Days	+13·56 Inches.	+55 Days	+10·80 Inches.	+46 Days	+11·76 Inches.	+49 Days

WEAR DISTRICT.

Place.	Stanhope Castle.	St. John's, Wolsingham.		Wolsingham.		Durham, Ushaw College		Durham Observatory.		Durham Observatory.	Sunderland, West Hendon House.		Sunderland, St.-Bede's Terrace.
Height of Guage—Above Sea Level	670 feet	928 feet.		464 feet.		600 feet.		352 ft. 5 in.		......	132 feet.		105 feet.
Height of Guage—Above Ground...	1 ft. 6 in	1 ft. 1 in.		1 foot.		10 inches.		4 ft. 6 in		......	1 foot.		6 inches.
Month.	Quantity.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Monthly Av. for 24 Years.	Quantity.	Days on wh Rain fell.	Quantity.
	Inches.	Inches		Inches.		Inches.		Inches.		Inches.	Inches.		Inches.
January	Monthly returns not furnished.	Monthly returns not furnished.	...	4·78	21	3·06	22	2·90	24	1·88	2·13	25	Monthly returns not supplied.
February			...	3·77	19	3·29	23	3·27	24	1·41	2·13	23	
March			...	4·48	19	3·20	20	3·65	20	1·71	2·72	20	
April			...	3·85	16	2·87	16	3·43	16	1·44	2·20	14	
May			...	2·23	17	1·97	18	2·43	16	1·84	1·62	17	
June			...	2·74	17	2·55	19	2·47	18	2·18	2·53	18	
July			...	5·03	14	4·52	15	4·03	15	2·33	2·96	12	
August			...	3·64	15	3·21	15	2·87	14	2·57	3·05	...	
September			...	4·65	19	4·65	20	4·75	20	2·61	4·18	20	
October			...	7·02	21	5·51	19	6·16	23	2·53	5·38	19	
November			...	6·27	24	4·67	21	6·35	24	2·18	3·71	21	
December			...	5·34	27	4·43	19	6·17	21	2·52	4·25	22	
Total for 1872	56·60	47·67	...	53·80	229	43·93	227	48·46	234	......	36·86	...	36·24
" 1871	32·82	33·60	166	31·53	173	27·88	162	24·69	154	......	23·30	158	......
" 1870	31·52	29·27	146	31·18	166	24·86	159	24·66	165	......	22·91	160	......
" 1869	44·16	30·87	167	36·70	177	26·82	163	29·56	169	......	24·25	...	......
" 1868	39·68	38·33	199	......	...	25·75	174	30·77	191	......	21·29	...	......
" 1867	32·33	32·53	192	......	...	25·85	159	19·45	...	......	......	...	......
" 1866	41·24	36·90	218	......	...	31·26	190	25·10	...	......	......	...	......
" 1865	......	28·91	199	......	...	29·73	168	24·51	...	......	......	...	......
" 1864	......	......	...	......	...	24·59	...	23·24	...	......	......	...	......
" 1863	......	......	...	......	...	28·90	...	24·09	...	......	......	...	......
" 1862	......	......	...	......	...	22·95	...	21·82	...	......	......	...	......
" 1861	......	......	...	......	...	26·03	...	24·28	...	......	......	...	......
" 1860	......	......	...	......	...	......	...	30·33	...	......	......	...	......
" 1859	......	......	...	......	...	......	...	21·57	...	......	......	...	......
" 1858	......	......	...	......	...	......	...	18·73	...	......	......	...	......
" 1857	......	......	...	......	...	......	...	26·55	...	......	......	...	......
" 1856	......	......	...	......	...	......	...	29·65	...	......	......	...	......
Average of Years	39·76 7 yrs.	34·78 8 yrs.	183 7 yrs.	38·30 4 yrs.	186 4 yrs.	28·21 12 yrs.	150 8 yrs.	26·32 17 yrs.	182 5 yrs.	......	25·72 5 yrs.	259 2 yrs.	36·24 1 year.
Difference in 1872 from Mean	+16·84 Inches.	+12·89 Inches.	...	+15·50 Inches.	+43 Days	+15·72 Inches.	+77 Days	+22·14 Inches.	+52 Days	......	+11·14 Inches.	...	......

COAST DISTRICT.

Place.	North Sunderland.		Cresswell.	Howick.		Whitley, The Vicarage.		Whitley Convalescent Home.	Earsdon.		Tynemouth Pier Works		Seaham Hall.	
Height of Guage—Above Sea Level	69 feet.		96 feet.	120 ft. 6 in.		82 feet.		18 feet.	185 feet.		61 ft. 10 in.		80 feet.	
Height of Guage—Above Ground...	1 ft. 2 in.		. .	10 inches		9 inches.		9 inches.	2 ft. 10 in.		1 ft. 2 in		1 foot	
Month.	Quantity.	Days on wh Rain fell	Quantity.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Quantity.	Days on wh Rain fell	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.
	Inches.		Inches.	Inches.		Inches.		Inches.	Inches.		Inches.		Inches.	
January	2·80	22	2·17	......	...	2·78	13	2·93	2·75	...	2·37	17	2·10	11
February	2·75	21	2·39	......	...	2·52	18	2·31	2·66	...	1·97	18	2·31	19
March	3·11	23	2·57	......	...	3·24	20	3·33	2·78	...	2·78	17	3·08	15
April	2·24	16	1·70	......	...	1·83	12	1·73	1·36	...	1·68	11	2·14	17
May	1·98	23	1·33	......	...	1·90	19	1·78	1·96	...	1·79	17	1·90	12
June	1·24	16	1·30	......	...	2·36	15	1·92	2·63	...	2·43	17	2·63	15
July	2·88	15	3·25	......	...	2·14	17	3·10	2·36	...	2·64	14	4·03	12
August	2·89	16	2·31	......	...	3·51	18	2·25	3·83	...	3·36	18	3·34	14
September	4·64	18	4·71	......	...	5·27	17	4·65	4·73	...	4·36	17	4·35	14
October	6·99	26	4·86	......	...	5·51	20	4·85	5·37	...	5·45	21	5·02	19
November	4·43	21	3·64	......	...	4·40	19	3·10	3·61	...	3·66	19	4·05	19
December	3·91	22	3·53	......	...	4·51	21	3·77	3·82	...	4·06	19	4·15	17
Total for 1872	39·86	239	33·53	41·32	164	39·97	206	35·72	37·86	...	36·55	208	39·10	184
" 1871	22·63	186	23·77	25·50	99	23·84	172	......	23·34	140	23·38	173	26·66	...
" 1870	22·57	179	20·55	22·99	120	21·79	115	......	21·04	149	22·68	174	21·63	102
" 1869	20·09	173	19·82	22·66	130	23·03	...	......	21·85	129	21·05	170	24·22	132
" 1868	23·23	162	19·82	25·22	124	25·37	...	......	......	...	24·22	...	22·56	145
" 1867	24·40	170	19·95	24·98	159	23·45	...	......	......	...	23·68	...	23·61	151
" 1866	25·75	189	26·37	28·88	168	28·35	...	......	......	...	23·47	...	28·32	154
" 1865	32·47	...	25·78	28·64	...	26·99	...	......	......	...	......	...	26·07	...
" 1864	......	...	22·42	22·01	...	26·64	...	......	......	...	......	...	22·74	...
" 1863	......	...	21·38	18·34	...	......	...	......	......	...	......	...	26·15	...
" 1862	......	...	24·77	19·30	...	......	...	......	......	...	......	...	......	...
" 1861	......	...	20·46	18·30	...	......	...	......	......	...	......	...	......	...
" 1860	......	...	26·78	27·48	...	......	...	......	......	...	......	...	......	...
" 1859	......	...	20·55	18·84	...	......	...	......	......	...	......	...	......	...
" 1858	......	...	19·43	22·51	...	......	...	......	......	...	......	...	......	...
" 1857	......	...	20·76	20·77	...	......	...	......	......	...	......	...	......	...
" 1856	......	...	24·88	22·58	...	......	...	......	......	...	......	...	......	...
Average of Years	26·37 8 yrs.	185 7 yrs.	22·92 17 yrs.	24·13 17 yrs.	137 7 yrs.	26·60 9 yrs.	164 3 yrs.	......	26·02 4 yrs.	139 3 yrs.	25·00 7 yrs.	181 4 yrs.	26·10 10 yrs.	144 6 yrs.
Difference in 1872 from Mean	+13·49 Inches.	+54 Days	+10·61 Inches	+17·19 Inches.	+27 Days	+13·37 Inches.	+42 Days	......	+11·84 Inches.	...	+11·55 Inches.	+27 Days	+13·00 Inches.	+40 Days

COQUET, WANSBECK, AND ALN DISTRICTS.

Place.	Harbottle.		Rothbury, Cragside.		Brinkburn Priory.		Meldon Park, Morpeth.		Wallington.		Lilburn Tower.	Glanton Pike.	Millfield, near Wooler.	Belford, Middleton Hall.
Height of Guage—Above Sea Level	500 feet.		400 feet.		300 feet.		333 feet.		398 ft. 6 in.		300 feet.	580 feet.	200 feet.	240 feet.
Height of Guage—Above Ground...	1 foot.		1 foot.		1 foot.		1 foot.		1 foot		6 feet.	4 inches.	4 inches.	2 feet.
Month.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Quantity.	Quantity.	Quantity.
	Inches.		Inches.		Inches.		Inches.		Inches.		Inches.	Inches.	Inches.	Inches.
January	3·79	24	2·96	12	3·00	16	2·70	20	3·32	21	Monthly returns not given.	2·86	2·95	3·97
February	3·33	21	3·33	13	3·52	18	3·28	23	3·58	23		3·23	2·96	1·43
March	3·79	16	5·05	10	4·02	18	4·23	20	4·15	21		3·28	3·13	1·29
April	4·25	13	5·62	10	3·27	12	3·07	16	3·95	15		4·03	4·13	3·31
May	2·16	12	2·97	11	2·17	18	2·21	21	1·88	22		3·15	3·49	3·69
June	3·45	12	1·83	7	2·54	17	2·40	19	2·56	19		1·84	1·99	2·25
July	4·77	14	3·64	9	3·43	15	4·00	15	4·36	16		4·33	3·34	3·85
August	3·06	17	4·02	12	3·63	15	3·92	15	3·83	19		4·05	3·18	3·83
September	6·57	20	5·40	14	3·61	21	4·62	23	5·69	23		6·37	7·23	4·44
October	7·17	19	6·33	14	6·19	17	5·65	21	5·99	20		6·72	5·46	7·09
November	5·88	20	5·56	16	4·38	19	4·79	23	5·35	22		4·74	5·59	4·62
December	7·21	17	7·92	14	6·16	20	6·91	22	6·10	22		6·18	4·77	3·71
Total for 1872	55·33	205	55·03	142	48·92	206	46·88	238	50·71	234	46·59	50·77	43·22	43·48
" 1871	22·17	93	29·39	92	31·22	184	28·49	...	32·19	209	25·44	30·17	29·13	25·98
" 1870	9 months	...	27·24	67	29·36	...	......	...	28·81	203	23·27	25·38	23·84	19·20
" 1869	......	...	26·94	86	25·24	...	......	...	29·25	193	23·97	25·14	23·34	23·20
" 1868	......	...	25·54	79	26·69	...	......	...	31·47	209	27·42	30·15	27·51	29·20
" 1867	......	...	16·25	...	33·68	...	......	...	28·99	198	26·61	27·82	24·45	24·10
" 1866	......	...	Imperfect	...	33·87	...	......	...	......	...	30·02	35·06	32·18	26·89
" 1865	......	...	......	...	32·45	...	......	...	......	...	30·39	34·26	28·65	28·92
" 1864	......	...	......	...	26·54	...	......	...	......	...	31·97	28·69	......	30·10
" 1863	......	...	......	...	......	...	......	...	......	...	25·86	30·09	......	......
" 1862	......	...	......	...	......	...	......	...	......	...	30·04	27·12	......	......
" 1861	......	...	......	...	......	...	......	...	......	...	26·17	27·10	......	......
" 1860	......	...	......	...	......	...	......	...	......	...	......	......	......	......
" 1859	......	...	......	...	......	...	......	...	......	...	25·98	......	......	......
" 1858	......	...	......	...	......	...	......	...	......	...	24·27	......	......	......
" 1857	......	...	......	...	......	...	......	...	......	...	27·11	......	......	......
" 1856	......	...	......	...	......	...	......	...	......	...	32·90	......	......	......
Average of Years	......	...	32·82 5 yrs.	93 5 yrs	31·99 9 yrs.	170 2 yrs.	37·68 2 yrs.	...	33·57 6 yrs.	207 6 yrs.	28·62 16 yrs.	29·31 12 yrs.	29·04 8 yrs.	27·89 9 yrs.
Difference in 1872 from Mean	......	...	+22·21 Inches.	+49 Days	+16·93 Inches.	+36 Days	+9·20 Inches.	...	+17·14 Inches.	+27 Days	+17·97 Inches.	+21·46 Inches.	+14·18 Inches.	+15·59 Inches.

TYNE DISTRICT.

Place.	Riccarton Junction.		Saughtree.		Deadwater.	Kieldar.		Falstone.		Byrness.		Otterburn Parsonage.		Otterburn, Dean Heal.		Bellingham, Hesleyside.		Humshaugh.	
Height of Guage—Above Sea Level	620 feet.		760 feet.		2,000 feet.	673 feet.		494 feet.		700 feet.		500 feet.		700 feet.		420 feet.		......	
Height of Guage—Above Ground...	1 ft. 6 in.		4 ft 6 in.		1 ft. 6 in.	1 ft. 6 in.		2 feet.		2 feet.		1 foot.		1 foot.		3 ft. 10 in.		1 ft. 3 in.	
Month.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell	No. 1. Quantity.	No. 2. Quantity.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.
	Inches.		Inches.		Inches	Inches.		Inches.		Inches.		Inches.		Inches.	Inches.	Inches.		Inches.	
January	8·16	23	7·14	27	Monthly returns not given.	6·60	22	4·87	24	5·10	24	No returns for 1872.	...	3·33	2·90	Monthly returns not furnished.	...	......	...
February	4·64	19	4·89	22		4·93	17	3·12	21	4·16	18		...	3·23	3·22		...	......	...
March	3·72	21	3·22	22		4·07	15	3·21	21	2·48	22		...	5·41	5·38		...	......	...
April	3·42	17	3·16	17		3·85	12	3·29	13	3·36	14		...	4·20	4·25		...	......	...
May	3·89	22	3·87	23		3·62	20	2·95	17	2·68	10		...	3·45	3·47		...	......	...
June	3·99	21	4·38	18		4·44	17	3·22	15	3·32	18		...	2·67	2·80		...	......	...
July	5·08	14	4·04	18		6·88	10	4·35	...	5·96	10		...	4·31	4·33		...	......	...
August	4·16	21	3·91	18		4·60	13	3·87	...	2·08	6		...	3·53	3·50		...	2·65	12
September	5·83	25	5·89	26		4·73	24	3·99	...	6·66	12		...	2·97	3·04		...	4·07	23
October	6·89	20	7·31	20		7·39	19	3·35	...	6·60	14		...	2·77	2·69		...	5·08	23
November	7·58	23	6·97	25		6·80	19	4·33	...	6·06	16		...	7·39	7·42		...	3·94	20
December	6·02	22	5·40	23		6·76	20	3·96	...	5·75	14		...	6·80	6·87		...	3·25	19
Total for 1872	63·38	248	60·18	259	82·70	64·67	208	44·51	...	54·21	178	......	...	50·06	49·87	53·76	152	......	...
" 1871	......	...	40·76	194	43·30	43·67	153	......	...	......	...	......	...	......	......	32·46	86	......	...
" 1870	......	...	......	...	37·50	......	...	......	...	28·12	...	26·45	...	......	......	31·99	74	......	...
" 1869	......	...	......	...	50·30	......	...	......	...	34·35	170	29·88	...	......	......	49·52	108	......	...
" 1868	......	...	......	...	......	......	...	......	...	37·26	187	34·06	143	......	......	......	...	......	...
" 1867	......	...	......	...	45·50	......	...	......	...	......	...	31·59	154	......	......	......	...	......	...
" 1866	......	...	......	...	55·40	......	...	......	...	......	...	36·02	...	......	......	......	...	......	...
" 1865	......	...	......	...	39·60	......	...	......	...	......	...	......	...	......	......	......	...	......	...
" 1864	......	...	......	...	42·80	......	...	......	...	......	...	......	...	......	......	......	...	......	...
" 1863	......	...	......	...	49·30	......	...	......	...	......	...	......	...	......	......	......	...	......	...
" 1862	......	...	......	...	......	......	...	......	...	......	...	......	...	......	......	......	...	......	...
" 1861	......	...	......	...	......	......	...	......	...	......	...	......	...	......	......	......	...	......	...
" 1860	......	...	......	...	......	......	...	......	...	......	...	......	...	......	......	......	...	......	...
" 1859	......	...	......	...	......	......	...	......	...	......	...	......	...	......	......	......	...	......	...
" 1858	......	...	......	...	......	......	...	......	...	......	...	......	...	......	......	......	...	......	...
" 1857	......	...	......	...	......	......	...	......	...	......	...	......	...	......	......	......	...	......	...
" 1856	......	...	......	...	......	......	...	......	...	......	...	......	...	......	......	......	...	......	...
Average	63·38 1 year.	248 1 yr.	50·47 2 yrs.	216 2 yrs.	49·60 9 yrs.	54·17 2 yrs.	180 2 yrs.	44·51 1 year.	...	38·48 4 yrs.	178 3 yrs.	31·60 5 yrs.	149 2 yrs	50·06 1 year.	49·87 1 year.	41·98 4 yrs.	105 4 yrs.	......	...
Difference in 1872 from Mean	......	...	+19·71 Inches.	+43 Days	+33·10 Inches.	+10·50 Inches.	+28 Days	......	...	+15·73 Inches.	...	......	...	......	......	+11·78 Inches.	+47 Days	......	...

Place.	Allenheads.		Haltwhistle, Unthank Hall.		Park End, Hexham.		Stamfordham.	Wylam.		Wylam.		Gateshead, Eighton Banks.	Whittle Dean.	Hallington Village.	Fawcett.	Woodford.
Height of Guage—Above Sea Level	1360 feet.		490 feet.		276 feet.		400 feet.	60 feet.		Monthly Average for 18 years.		615 feet.	400 feet.	469 feet.	563 feet.	500 feet.
Height of Guage—Above Ground...	1 foot.		9 inches		4 inches.		1 foot.	5 feet.				10 inches.	6 inches.	6 inches.	6 inches.	6 inches.
Month.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Quantity.	Days on wh Rain fell.	Quantity.	Days.	Quantity.	Quantity.	Quantity.	Quantity.	Quantity.
	Inches.		Inches.		Inches.		Inches.	Inches.		Inches.		Inches.	Inches.	Inches.	Inches.	Inches.
January	6·21	24	3·75	24	3·63	22	2·89	3·16	16	2·04	1·46	2·46	2·72	3·23	2·86	2·97
February	4·94	27	2·60	18	2·79	21	2·45	2·42	19	1·52	12·55	2·23	2·43	3·16	2·84	2·61
March	5·44	24	2·86	20	2·35	17	3·43	3·48	19	1·85	14·00	3·38	2·35	4·34	2·77	4·54
April	5·13	15	2·72	14	2·70	16	2·79	3·36	16	1·78	11·72	2·79	3·14	2·84	2·15	2·08
May	4·44	21	2·82	17	2·13	21	1·44	1·63	12	1·83	11·72	1·91	1·20	1·82	1·73	2·03
June	4·20	22	3·52	20	3·30	26	2·53	2·08	16	2·25	11·50	2·39	2·10	2·09	2·05	2·42
July	4·14	18	4·25	14	4·89	18	4·67	4·61	15	2·05	12·00	3·59	4·17	4·51	4·61	4·98
August	3·43	21	4·54	18	3·74	20	3·69	4·52	19	2·67	14·50	3·48	3·44	2·99	2·91	2·88
September	6·02	27	4·87	23	4·52	24	4·42	3·96	19	2·50	14·67	4·26	3·88	4·36	4·08	4·13
October	8·08	24	5·47	20	5·85	21	5·47	5·39	21	2·95	14·55	5·15	5·40	7·03	6·58	6·87
November	7·39	28	4·77	26	4·85	24	4·63	4·88	21	2·54	15·28	4·61	3·96	3·79	3·26	3·42
December	5·96	24	4·05	22	3·57	21	4·66	5·20	19	2·25	15·89	5·33	4·61	5·76	4·93	5·12
Total for 1872	65·38	275	46·29	236	44·32	251	43·07	44·64	212	26·26	16·30	41·58	39·40	45·92	40·77	44·05
" 1871	42·76	265	23·01	185	29·78	...	26·51	26·69	153	Yearly for 18	Average Years.	28·00	27·00	30·62	28·59	29·31
" 1870	44·29	248	26·90	162	25·16	162	26·15	24·43	154			24·90	19·38	26·19	23·26	25·56
" 1869	54·40	267	33·09	189	33·43	201	24·93	25·15	157	......	......	26·56	23·06	28·54	26·96	29·36
" 1868	56·40	266	......	...	34·33	203	25·41	26·43	131	......	......	24·78	23·77	28·69	27·08	29·17
" 1867	49·45	268	......	...	28·53	216	25·53	22·58	144	......	......	......	23·39	25·07	25·66	26·65
" 1866	56·84	287	......	...	41·83	228	30·09	29·81	173	......	......	......	33·45	33·42	31·35	33·84
" 1865	44·42	248	......	...	29·80	...	27·41	29·67	156	......	......	......	......	......	......	......
" 1864	43·24	258	......	...	29·02	...	26·93	27·57	206	......	......	......	25·92	27·70	26·25	26·08
" 1863	54·01	...	......	...	41·77	...	28·60	28·39	185	......	......	......	27·09	32·66	31·56	30·25
" 1862	44·20	281	......	...	34·76	...	26·00	24·68	211	......	......	......	24·32	27·62	25·95	24·93
" 1861	49·35	282	......	...	31·07	...	26·22	23·58	...	......	......	......	......	......	......	......
" 1860	59·15	297	......	...	31·04	...	35·26	31·38	...	......	......	......	......	......	......	......
" 1859	47·70	259	......	...	......	...	27·85	25·15	...	......	......	......	......	......	......	......
" 1858	37·21	229	......	...	26·00	...	29·19	18·20	...	......	......	......	......	......	......	......
" 1857	41·79	...	......	...	25·68	...	28·86	24·47	...	......	......	......	......	......	......	......
" 1856	49·48	...	......	...	45·87	...	35·06	29·25	...	......	......	......	......	......	......	......
Average	48·82 17 yrs.	266 14 yr.	32·31 4 yrs.	193 4 yrs.	33·27 16 yrs.	210 6 yrs.	28·59 17 yrs.	21·41 17 yrs.	171 11 yr.	......	......	29.16 5 yrs.	26·67 10 yrs.	30·64 10 yrs.	28·74 10 yrs.	30·02 10 yrs.
Difference in 1872 from Mean	+16·56 Inches.	+9 Days	+13·98 Inches.	+43 Days	+11·05 Inches.	+41 Days	+14·48 Inches.	+23·23 Inches.	+41 Days	......	.....	+12·42 Inches.	+12·73 Inches.	+15·28 Inches.	+12·03 Inches.	+14·03 Inches.

Place.	Camphill, Gunnerton	Green Crag.	Valley of No. Tyne.	Bywell		Shotley Hall.		Newcastle, 30, Rye Hill.	
Height of Guage—Above Sea Level	676 feet.	800 feet.	300 feet.	8 ft. 6. in.		212 feet.		200 feet.	
Height of Guage—Above Ground...	6 inches.	6 inches.	6 inches.	6 inches.		3 inches.		1 ft 6 in.	
Month.	Quantity.	Quantity.	Quantity.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.
	Inches.	Inches.	Inches.	Inches.		Inches.		Inches.	
January	2·94	2·97	3·07	4·30	21	3·96	19	......	...
February	2·72	2·66	2·57	3·72	24	2·79	17	......	...
March	3·73	3·88	3·04	4·60	24	3·68	18	......	...
April	1·87	1·71	1·80	3·80	17	2·95	10	......	...
May	2·59	3·00	2·40	1·73	23	1·55	10	......	...
June	2·58	2·56	2·54	2·57	22	2·61	13	......	...
July	5·18	5·17	5·43	4·60	15	6·49	6	......	...
August	3·92	3·74	3·58	4·18	17	3·55	13	......	...
September	3·63	3·98	3·60	5·20	24	3·15	16	......	...
October	6·82	7·48	6·51	5·83	24	5·85	17	......	...
November	3·44	3·63	3·30	5·13	27	5·43	20	......	...
December	5·15	5·49	4·23	5·50	26	6·02	19	......	...
Total for 1872	44·57	45·82	42·07	51·16	264	48·03	178	41·56	214
" 1871	29·24	31·49	28·72	33·53	204	26·96	144	25·45	159
" 1870	24·84	25·58	22·89	25·84	195	25·47	118	22·61	144
" 1869	20·90	30·59	29·20	24·97	204	26·22	148	25·48	179
" 1868	30·60	29·89	30·11	27·70	199	28·01	148	......	...
" 1867	29·95	28·49	26·97	27·55	227	......	...	......	...
" 1866	34·18	34·28	33·45	29·19	230	......	...	......	...
" 1865	......	......	......	29·82	186	......	...	......	...
" 1864	23·09	27·69	24·96	28·81	188	......	...	......	...
" 1863	32·31	30·40	31·31	28·49	198	......	...	......	...
" 1862	29·45	22·19	26·68	26·49	199	......	...	......	...
" 1861	......	......	......	23·80	213	......	...	......	...
" 1860	......	......	......	38·00	259	......	...	......	...
" 1859	......	......	......	27·34	182	......	...	......	...
" 1858	......	......	......	21·88	165	......	...	......	...
" 1857	......	......	......	27·55	...	......	...	......	...
" 1856	......	......	......	29·82	...	......	...	......	...
Average	29·91 10 yrs.	30·64 10 yrs.	29·63 10 yrs.	29·53 17 yrs.	206 16 yr.	30·93 5 yrs.	147 5 yrs.	28·77 4 yrs.	174 4 yrs.
Difference in 1872 from Mean	+14·66 Inches.	+15·18 Inches.	+12·44 Inches.	+21·63 Inches.	+58 Days	+17·10 Inches.	+31 Days	+12·97 Inches.	+40 Days

Place.	Newcastle, Deaf and Dumb Institution.		Newcastle, Lit. and Phil. Institution.		Wallsend.	North Shields, Rosella Place.		North Shields, Clementhorpe.		North Shields, Low Lights.		Tynemouth Pier Works.		South Shields, Marine School.
Height of Guage—Above Sea Level	200 ft. 9 in.		105 feet.		100 feet.	125 feet.		150 feet.		22 feet.		61 ft. 2 in.		40 feet.
Height of Guage—Above Ground...	6 inches.		7. inches.		10 inches.	1 foot.		1 foot.		8 ft. 4 in.		1 ft. 10 in.		7 inches.
Month.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.	Days on wh Rain fell.	Quantity.
	Inches.		Inches.		Inches.	Inches.		Inches.		Inches.		Inches.		Inches.
January	2·88	23	2·45	...	4·91	2·78	18	2·52	16	2·71	16	2·37	17	......
February	2·05	23	1·86	...	4·43	2·39	22	2·13	18	2·02	18	1·97	18	2·10
March	3·42	21	3·32	...	5·46	3·45	18	3·05	18	3·16	18	2·78	17	2·84
April	2·46	16	2·30	...	4·95	1·94	12	1·83	12	1·75	12	1·68	11	1·80
May	1·65	16	1·98	...	2·99	1·96	17	1·51	19	1·59	18	1·79	17	1·70
June	2·98	18	3·12	...	2·64	2·95	19	2·54	19	2·67	19	2·43	17	2·86
July	2·91	15	3·16	...	2·47	2·39	18	2·21	12	2·27	14	2·64	14	......
August	3·97	18	2·10	...	1·50	3·71	20	3·58	16	3·27	16	3·36	18	.....
September	4·29	21	4·82	...	2·42	4·79	18	4·07	19	4·74	19	4·36	17	4·43
October	5·43	21	5·63	...	2·63	5·96	21	5·30	21	5·04	19	5·45	21	6·48
November	4·58	20	5·12	...	2·00	4·11	19	3·70	20	3·78	17	3·66	19	3·88
December	4·87	20	5·47	...	2·83	4·46	23	3·93	20	4·35	19	4·06	19	4·85
Total for 1872	41·49	232	41·35	...	39·23	40·89	225	36·37	210	37·35	205	36·55	208	......
" 1871	26·16	219	20·91	116	25·89	26·18	204	23·40	163	24·11	162	23·38	173	......
" 1870	25·10	181	23·58	109	23·90	25·22	172	21·74	152	23·65	149	22·68	174	......
" 1869	24·78	155	30·01	160	24·35	23·93	166	20·70	163	22·42	160	21·05	170	......
" 1868	24·51	154	26·25	175	24·49	23·35	173	20·92	174	22·46	171	24·22	...	......
" 1867	......	...	22·29	134	25·24	26·61	163	......	...	22·49	175	23·68	...	......
" 1866	......	...	22·19	169	26·65	25·39	188	......	...	26·62	192	23·47	...	......
" 1865	......	...	21·24	124	27·29	26·89	130	......	...	25·56	142	......	...	......
" 1864	......	...	......	...	27·82	26·00	...	......	...	27·60	...	......	...	......
" 1863	......	...	......	...	26·24	24·70	...	......	...	24·74	224	......	...	......
" 1862	......	...	......	...	25·68	28·01	...	......	...	28·01	260	......	...	......
" 1861	......	...	19·58	...	24·62	24·76	...	......	...	24·76	264	......	...	......
" 1860	......	...	27·40	...	34·12	32·19	...	......	...	32·18	290	......	...	......
" 1859	......	...	18·41	...	25·31	......	...	......	...	......	...	......	...	......
" 1858	......	...	13·29	...	......	......	...	......	...	......	...	......	...	......
" 1857	......	...	16·43	...	......	......	...	......	...	......	...	......	...	......
" 1856	......	...	21·22	...	......	......	...	......	...	......	...	......	...	......
Average	28·40 5 yrs	188 5 yrs.	23·13 14 yrs.	141 7 yrs.	27·16 14 yrs.	27·24 13 yrs.	177 8 yrs.	24·62 5 yrs.	172 5 yrs.	26·30 13 yrs.	199 12 yr.	25·00 7 yrs.	181 4 yrs.	......
Difference in 1872 from Mean	+13·09 Inches.	+44 Days	+18·22 Inches.	...	+12·07 Inches.	+13·65 Inches.	+48 Days	+11·75 Inches.	+38 Days	+11·05 Inches.	+6 Days	+11·53 Inches.	+27 Days	......

LEAFING, BLOSSOMING, &c., OF FOREST TREES AND SHRUBS, 1872.

FOREST TREES AND SHRUBS.	ROTHBURY.				CRESSWELL.				MELDON.				WALLINGTON (H).				NORTH SHIELDS (C).		SEAHAM HALL.	
	In Bud.	In Leaf.	In Blossom	Divested of Leaves.	In Bud.	In Leaf.	In Blossom	Divested of Leaves.	In Bud.	In Leaf.	In Blossom	Divested of Leaves.	In Bud.	In Leaf.	In Blossom	Divested of Leaves.	In Leaf.	In Blossom	In Leaf.	In Blossom
Alder	......	April 30	Mar. 24	Oct. 26	......	May 8	Mar. 27	Nov. 6	Mar. 22	May 13	Mar. 15	Nov. 2	Mar. 15	April 6	......	Oct. 30	......	......	May 27	......
Ash	April 24	May 30	......	Nov. 2	......	June 1	April 11	Oct. 23	April 21	May 30	May 23	Oct. 24	May 13	June 4	May 4	Oct. 22	......	......	......	......
Barberry	Mar. 18	April 24	June 2	Nov. 30	April 10	May 1	May 20	Oct. 30	Mar. 12	April 25	June 2	Nov. 6	Feb. 16	Mar. 16	May 20	Nov. 5	......	......	......	......
Beech	......	May 10	......	......	May 4	May 10	......	Nov. 7	April 4	May 3	May 25	Nov. 12	Mar. 1	April 29	May 21	Oct. 28	May 13	......	......	......
Birch	Mar. 24	May 2	......	Nov. 6	April 18	May 1	Mar. 27	Oct. 27	Mar. 15	April 28	April 20	Nov. 8	Feb. 23	April 24	May 4	Nov. 2	......	......	......	......
Black Thorn	......	......	......	......	Mar. 30	April 28	April 12	Oct. 30	Mar. 9	April 23	April 25	Nov. 4	Feb. 28	April 7	May 1	Nov. 1	......	April 10	......	......
Bramble	......	.. ...	......	......	Mar. 10	May 8	June 18	Nov. 12	Jan. 30	Mar. 28	July 13	Jan. 27	Jan. 30	April 4	July 16	......	......	June 22	......	......
Broom	......	... ..	......	......	......	April 15	Mar. 20	Nov. 6	Mar. 30	April 30	May 18	Oct. 26	Feb. 19	April 29	May 18	Nov. 22	......	May 20	......	......
Elder	Feb. 24	Mar. 28	July 6	Nov. 28	Mar. 10	April 25	June 12	Oct. 20	Jan. 25	Mar. 16	June 29	Nov. 12	Feb. 1	Mar. 4	June 19	Nov. 6	......	June 18	April 4	......
Elm	......	......	......	......	April 11	May 1	Mar. 10	Oct. 17	Mar. 30	April 30	Feb. 16	Oct. 26	April 10	April 30	Mar. 14	Nov. 20	......	......	......	Mar. 11
Flowering Currant	Mar. 6	Mar. 28	April 6	Nov. 20	Feb. 10	Mar. 17	Mar. 3	Oct. 30	Jan. 23	Mar. 7	April 6	Nov. 28	Jan. 22	Mar. 4	Mar. 12	Nov. 6	......	Mar. 4	......	Mar. 26
Hawthorn	Mar. 8	April 20	June 1	Nov. 18	Feb. 25	Mar. 30	May 15	Oct. 27	Feb. 20	April 18	May 28	Nov. 30	Feb. 1	Mar. 16	June 1	Oct. 25	Mar. 12	May 17	April 5	... ..
Hazel	......	......	......	......	April 11	May 1	Feb. 6	Oct. 30	Feb. 27	April 26	Feb. 17	Nov. 30	Feb. 2	April 12	Feb. 21	Oct. 28	......	......	......	......
Holly	......	......	......	......	......	......	May 17	......	April 22	June 8	June 1	Sept. 19	Mar. 20	May 30	June 2	July 25	......	......	......	......
Honeysuckle	......	Mar. 14	June 14	Dec. 6	Mar. 10	April 8	June 25	Nov. 3	Jan. 23	Mar. 25	June 29	Nov. 19	Jan. 6	Jan. 18	May 30	Oct. 30	......	......	......	......
Laburnum	......	......	......	......	April 1	May 6	May 25	Nov. 6	Feb. 16	April 23	May 29	Nov. 11	Feb. 5	April 15	May 20	Nov. 6	......	May 16	......	......
Larch	......	......	......	......	Mar. 10	April 11	Mar. 20	Oct. 30	Mar. 4	April 9	April 3	Nov. 8	Feb. 22	Mar. 16	Mar. 6	Nov. 4	......	......	April 5	......
Lilac	Mar. 4	April 8	May 30	Nov. 8	Mar. 10	April 15	May 8	Oct. 30	Feb. 12	April 8	May 27	Nov. 8	Feb. 3	April 4	May 22	Nov. 2	......	May 8	April 4	May 13
Lime	......	......	......	......	April 8	May 8	July 5	Oct. 27	Mar. 30	May 6	July 20	Oct. 26	Mar. 1	April 30	July 24	Oct. 26	......	......	......	......
Mountain Ash	......	April 14	May 18	Oct. 28	April 11	April 18	May 10	Oct. 23	Feb. 12	April 21	June 4	Nov. 8	Feb. 15	April 10	May 27	Oct. 31	......	May 20	......	....
Oak	......	......	......	......	May 6	May 26	June 1	Nov. 6	April 23	May 29	June 3	Nov. 16	May 1	May 24	June 3	Nov. 26	......	......	May 21	......
Poplar	......	......	......	......	April 1	April 10	Mar. 7	Oct. 17	Mar. 30	May 26	April 15	Nov. 12	Feb. 2	Mar. 14	......	Oct. 8	Mar. 12	......	April 11	......
Privet	......	......	......	......	April 11	May 8	July 5	......	Mar. 25	April 30	July 20	......	Feb. 25	April 4	July 4	......	......	......	......	......
Rose	......	......	......	......	Mar. 10	April 15	June 21	Nov. 7	Jan. 27	April 1	June 24	Nov. 30	Jan. 25	Mar. 12	June 18	Nov. 16	......	......	......	......
Sallow	......	......	......	......	Mar. 10	April 10	Mar. 10	Nov. 7	Mar. 9	April 25	Mar. 9	Nov. 5	Feb. 6	April 8	Mar. 11	Nov. 5	......	......	......	......
Sycamore	Mar. 8	April 24	May 16	Oct. 30	April 11	May 1	May 6	Oct. 20	April 2	April 25	May 5	Oct. 25	Mar. 7	April 15	May 2	Nov. 1	May 2	......	......	......
Whin	......	......	April 14	......	......	......	Mar. 12	......	Mar. 30	May 16	Feb. 22	......	Jan. 26	May 1	Feb. 10	......	......	......	......	.....

BLOSSOMING AND YIELD OF STANDARD FRUIT TREES, &c., 1872.

STANDARD FRUIT TREES, ETC.	NORTH SUNDERLAND.	CRESSWELL.		MELDON.		WALLINGTON (H).		NORTH SHIELDS (C).	GAINFORD.
	Yield.	In Blossom	Yield.	In Blossom.	Yield.	In Blossom	Yield.	In Blossom	Yield.
Apple	Very scarce	May 12	Bad	May 5	Partial	May 2	Partial	April 29	Moderate.
Cherry	Very poor	April 12	Good	April 27	Moderate	April 23	Moderate	April 25	Moderate.
Pear	Very scarce	April 15	Good	April 23	Poor	April 22	Average	......	Good.
Plum	....	April 12	Partial	April 25	Moderate	April 11	Partial	......	Failure
Currant	Very good on walls.	April 10	Good	May 1 (blk) Ap. 13 (red)	Abundant	April 6	Plentiful	April 1	Good.
Gooseberry	Average	April 1	Average	Mar. 30	Good	April 7	Plentiful	April 1	......
Raspberry	Abundant; fruit large,	June 15	Good	June 8	Good	June 3	Plentiful	......	Bad.
Strawberry	Abundant, but spoiled by wet,	May 20	Good	May 2	Moderate	May 9	Plentiful	May 2	Good.

SOWING, YIELD, &c., OF GRAIN AND OTHER CROPS, 1872.

CROPS.	NORTH SUNDERLAND.		MELDON.			WALLINGTON (H).			SEAHAM HALL.
	Yield.	Quality.	Sown.	Cut, or Gathered.	Yield.	Sown.	Cut, or Gathered.	Yield.	Yield.
Barley	Average	Indifferent	April 11	Sept. 21	Moderate	April 20	Sept. 2	Good	......
Beans	Good	Good	......	......	......	......	......	......	......
Hay	Heavy	Indifferent	......	July 2	Good	Old Land	July 1	Heavy	Plentiful.
Mangold	......	......	May 18	Nov. 8	Moderate	......	......	......	......
Oats	Good	Good	......	Sept. 12	Good	April 18	Sept. 10	Heavy	......
Peas	Good	Good	......	......	......	......	.. ...	......	......
Potatoes	Abundant	Half diseased,	May 21	Nov. 12	Very bad	May 22	Oct. 28	Good; a third diseased.	Bad.
Turnips	Plentiful	Lightly bulked.	......	......	......	May 23	Nov. 30	Heavy, large.	......
Wheat	Two thirds	Bad	......	Sept. 24	Fair average.	......	......	......	......

F INSECTS, 1872.

DON.	WALLINGTON (D).		SEAHAM HALL.	DARLINGTON.	GAINFORD.
Prev.	App.	Prev.	Prev.	App.	Prev.
bundant	Mar. 16	Abundant ...	......	April 14	.....
... ..	July 9	Abundant ...	......	......	......
......	June 23	Scarce.........	......	......	......
......	June 16	Scarce.........	......	......	....
......	June 24	Scarce.........	......	......	......
......	June 24	Scarce.........	.. ...	......	......
arce..........	Feb. 2	Scarce.........	Common.........	March 4	......
......	May 30	Abundant ...	......	......	......
......	July 10	Scarce.........	......	......	......
......	June 25	Abundant ...	......	......	......
......	......	......	......	......	......
......	......	......	......	......	......
warms many. Honey moderate	Jan. 16	Swarm June 3	First swarm June 17	......	First swarm May 26
bundant	Mar. 16	Abundant ...	......	......	......
umerous	Jan. 30	Abundant ...	Rare	April 11	......

NESTING OF BIRDS AT WINLATON, 1872.

BIRDS.	Date.	BIRDS.	Date.
....	Mar. 3	Skylark..................................	May 3
n Thrush	Mar. 11	Kestrel .... Ring Ouzel	May 5
r Owl........................... ared Owl	Mar. 31	Sand Piper .... Marsh Titmouse .... Redstart .... Chiff Chaff .... Whitethroat	May 9
ailed Titmouse	April 2	Jay...................................... Black Cap............................	May 12
Thrush .... ıst .... Sparrow	April 6	Kingfisher (with young) ...... Grasshopper Warbler .... Yellow Bunting (with young)..	May 16
Tit	April 14	Willow Wren .... Wood Wren	May 19
Plover .... Hen .... Plover	April 15	Titlark	June 2
agtail .... -crested Wren	April 16	Night Hawk............................	June 11
g.................................. Crow	April 20		
ouse .... w Hawk........................... ock	April 28		

BLOSSOMING OF WILD FLOWERS, 1872.

WILD FLOWERS.	ROTHBURY.	CRESSWELL.	MELDON.	WALLINGTON (H).	NORTH SHIELDS (C).	SEAHAM HALL.	DARLINGTON.
	In Blossom.	In Blossom.	In Blossom.	In Blossom	In Blossom.	In Blossom.	In Blossom.
Anemone	Mar. 28	Mar. 27	Mar. 15	Mar. 31	......	April 11	......
Bulbous Crowfoot	May 4	Mar. 31	May 20	May 1	May 4	......	......
Coltsfoot	Mar. 14	Mar. 8	Mar. 9	Mar. 5	Jan. 13	Feb. 19	Mar. 2
Cowslip	April 10	April 8	April 27	Mar. 16	April 18	......	......
Dandelion	April 6	April 8	April 9	Mar. 11	Mar. 3	......	......
Forget-me-not	June 14	June 6	May 24	June 19	May 18	......	......
Garlic	......	July 1	May 13	May 15	......	May 1	......
Hyacinth	......	May 1	May 2	May 21	May 8	......	......
Lily of the Valley	......	May 15	May 13	May 21	May 5	......	......
Marsh Marigold	......	April 16	April 27	April 10	......	......	......
Pilewort	......	Mar. 31	April 10	Mar. 8	Mar. 4	......	......
Primrose	Mar. 11	Feb. 8	Mar. 30	Jan. 8	Mar. 29	......	Mar. 4
Red Poppy	July 8	July 3	June 25	......	......	......	......
Stitchwort	......	April 16	May 2	May 4	......	......	......
Snowdrop	Feb. 14	Feb. 6	Feb. 1	Feb. 2	......	......	Feb. 4
Strawberry	......	Mar. 27	May 9	Mar. 2	......	......	......
Veronica Chamædrys	......	May 12	May 17	May 8	May 2	......	......
Violet	April 10	Mar. 4	April 15	April 12	Mar. 30	Mar. 11	......

FLOWERING OF PLANTS AT TYNEMOUTH, 1872.

WILD PLANTS GROWING WITHIN THREE MILES OF TYNEMOUTH.	Date of Flowering	PLANTS GROWING IN GARDEN NEAR NORTH SHIELDS.	Date of Flowering.
Tussilago farfara (coltsfoot)	Jan. 13	Snowdrop	Feb. 3
Veronica hederifolia (ivy-leaved speedwell)	Feb. 26	Crocus—yellow	Feb. 28
Lamium album (white dead nettle)	Mar. 23	Crocus—white	Feb. 28
Lamium purpureum (red dead nettle)	Mar. 15	Crocus—purple	Feb. 28
Ranunculus ficaria (pilewort)	Mar. 4	Red flowering currant (against E. wall)	Feb. 21
Ribes grossularia (gooseberry)	Mar. 18	Red flowering currant (standard)	Mar. 18
Viola canina (dog violet)	Mar. 30	Daffodil	Mar. 16
Taraxacum officinale (dandelion)	Mar. 3	Red currant	April 1
Primula vulgaris (primrose)	Mar. 29	Gooseberry	April 1
Prunus spinosus (blackthorn)	April 10	Jargonelle pear	April 6
Primula veris (cowslip)	April 18	Cherry tree	April 18
Glechoma hederacea (ground-ivy)	April 5	Apple tree	April 29
Veronica Chamædrys (germander speedwell)	May 2	Strawberry	May 2
Trifolium pratense (purple clover)	May 8	Lily of the Valley	May 5
Ranunculus bulbosus (bulbous crowfoot)	May 4	Blue hyacinth	May 8
Potentilla anserina (silver weed)	May 16	Purple lilac	May 8
Mountain ash	May 20	Laburnum	May 16
Cratægus oxyacanthus (hawthorn)	May 17	London pride	May 8
Broom	May 20		

APPEARANCE AND PREVALENCE OF INSECTS, 1872.

INSECTS.	NORTH SUNDERLAND.		BYRNESS.	ROTHBURY.		CRESSWELL.		MELDON.		WALLINGTON (D).		SEAHAM HALL.	DARLINGTON.	GAINFORD.
	App.	Prev.	App.	App.	Prev.	App.	Prev.	App.	Prev.	App.	Prev.	Prev.	App.	Prev.
Small White Butterfly	May 4	......	......	April 4	Very few	May 1	Abundant	Mar. 16	Abundant	Mar. 16	Abundant	......	April 14	......
Holly Blue Butterfly	......	......	......	......	......	July 3	Scarce	......	......	July 9	Abundant	......	......	......
Lesser Heath Butterfly	......	......	......	......	......	April 20	Abundant	......	......	June 23	Scarce	......	......	......
Orange Tip Butterfly	......	......	......	June 8	Scarce	June 16	Scarce	......	......	June 16	Scarce	......	......	...
Painted Lady Butterfly	June 27	Very scarce	......	......	......	......	......	......	......	June 24	Scarce	......	......	......
Red Admiral Butterfly	......	......	Mar. 4	Aug. 24	Scarce	July 23	Scarce	......	......	June 24	Scarce	......	......	......
Tortoise Shell Butterfly	April 8	Very scarce	......	......	......	May 1	Scarce	Mar. 5	Scarce	Feb. 2	Scarce	Common	March 4	......
Brimstone Moth	......	......	......	......	......	......	......	......	......	May 30	Abundant	......	......	......
Currant Moth	......	......	......	......	......	......	......	......	......	July 10	Scarce	......	......	......
Ghost Moth	......	......	......	......	......	......	......	......	......	June 25	Abundant	......	......	......
Small Dagger Moth	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Cockchafer	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Hive Bee	......	......	Mar. 5	......	......	Mar. 4	......	Jan. —	Swarms many. Honey moderate	Jan. 16	Swarm June 3	First swarm June 17	......	First swarm May 26
Humble Bee	April 18	Scarce	April 8	......	......	April 7	Abundant	Mar. 6	Abundant	Mar. 16	Abundant	......	......	......
Wasp	April 28	Abundant	April 29	April 26	Very numerous	April 10	Abundant	April 12	Numerous	Jan. 30	Abundant	Rare	April 11	......

ARRIVAL, DEPARTURE, AND PREVALENCE OF MIGRATORY BIRDS, 1872.

MIGRATORY BIRDS.	NORTH SUNDERLAND.		BYRNESS.	ROTHBURY.			CRESSWELL.			MELDON.		WALLINGTON (D).			NORTH SHIELDS (C).	WINLATON.	SEAHAM HALL.			DARLINGTON.	GAINFORD.
	Arr.	Prev.	Arr.	Arr.	Dep.	Prev.	Arr.	Dep.	Prev.	Arr.	Prev.	Arr.	Dep	Prev.	Arr.	Arr.	Arr.	Dep.	Prev.	Arr.	Arr.
Black Cap	April 29	......	......	......	......	......	April 8	......	Abundant	......	......	April 28	Sept. 11	Scarce	......	......	May 10	......	Average	......	......
Chiff Chaff	......	Abundant	......	......	......	......	April 12	......	Scarce	......	......	June 12	Sept. 2	Scarce	......	April 2	April 8	......	......	......	......
Cornerake	May 6	......	......	May 29	......	Scarce	June 22	......	Scarce	May 20	Scarce	May 12	Sept. 6	Scarce	May 3	......	May 10	......	Rare	......	......
Cuckoo	......	......	......	April 26	June 24	Numerous	April 27	June 20	......	April 29	Scarce	April 28	Aug. 28	Abundant	May 3	April 28	May 8	......	......	......	......
Fieldfare	......	......	......	Oct. 24	......	Numerous	Oct. 3	Mar. —	Abundant	......	......	Nov. 10	Mar. 22	Abundant	......	......	Oct. 9	April 29	......	......	......
Martin	May 14	......	......	April 27	Aug. —	Scarce	......	......	......	......	......	May 10	Aug. 21	Scarce	April 22	April 12	April 14	......	......	......	......
Redstart	......	......	......	......	......	......	May 15	......	......	......	......	April 18	Sept. 10	Abundant	May 15	April 28	May 14	......	Rare	......	......
Redwing	......	......	......	......	......	......	Oct. 3	Mar. —	Abundant	......	......	Nov. 10	Mar. 20	Scarce	......	......	Oct. —	......	Rare	......	......
Snow Bunting	......	......	......	......	......	......	......	......	......	......	......	Oct. 15	April 22	Abundant	......	......	Nov. —	......	Rare	......	......
Swift	May 18	......	......	......	......	......	......	......	......	......	......	June 8	Sept. 1	Scarce	......	......	June 5	......	Rare	......	March 16
Swallow	April 24	......	April 23	April 29	Oct. 3	Numerous	April 28	Sept. 23	Abundant	April 28	Numerous	April 24	Sept. 30	Abundant	April 22	April 12	April 24	......	......	April 15	April 27
Wheatear	......	......	March 17	......	......	......	April 22	......	......	......	......	April 29	Sept. 24	Scarce	......	April 28	May —	......	......	......	......
Willow Wren	May 11	......	......	......	......	......	April 22	Sept. —	Abundant	......	......	April 16	Sept. 26	Abundant	......	April 2	April 15	......	......	......	April 27
Woodcock	Oct. 21	......	......	......	......	......	Oct. 15	April 2	......	Nov. 16	Scarce	Oct. 20	Feb. 10	Scarce	......	......	......	......	Rare	......	......
Yellow Wagtail	May 24	......	......	......	......	......	April 1	Sept. —	Scarce	Mar. 11	Scarce	April 10	Oct. 1	Scarce	......	......	......	......	......	......	......

NESTING OF BIRDS AT WINLATON, 1872.

BIRDS.	Date.	BIRDS.	Date.
Dipper	Mar. 3	Skylark	May 3
Common Thrush	Mar. 11	Kestrel Ring Ouzel	May 5
Tawney Owl Long-eared Owl	Mar. 31	Sand Piper Marsh Titmouse Redstart Chiff Chaff Whitethroat	May 9
Long-tailed Titmouse	April 2	Jay Black Cap	May 12
Missel Thrush Redbreast Hedge Sparrow	April 6	Kingfisher (with young) Grasshopper Warbler Yellow Bunting (with young)	May 16
Great Tit	April 14	Willow Wren Wood Wren	May 19
Golden Plover Water Hen Green Plover	April 15	Titlark	June 2
Grey Wagtail Golden-crested Wren	April 16	Night Hawk	June 11
Starling Carrion Crow	April 20		
Red Grouse Curlew Sparrow Hawk Woodcock	April 28		

ADDRESS TO THE MEMBERS OF THE TYNESIDE NATURALISTS' FIELD CLUB,

READ BY THE PRESIDENT, REV. J. E. LEEFE, M.A., AT THE TWENTY-EIGHTH ANNIVERSARY MEETING, HELD IN THE MUSEUM OF THE NATURAL HISTORY SOCIETY, NEWCASTLE-UPON-TYNE, ON WEDNESDAY, APRIL 29TH, 1874.

Gentlemen,—I am sure it may well seem presumptuous in me to occupy the chair of a Society which numbers amongst its members so many persons of distinguished scientific attainments. But when the very flattering proposition of the Committee was made to me a second time, I felt that I could not do otherwise than accede to their wishes; and I am not sorry, as a clergyman, to have this opportunity of bearing public testimony to the value which I think attaches to such institutions as the "Tyneside Naturalists' Field Club."

It is true that the excursions of the Club may, at times, appear to partake a good deal of a pic-nic character; but the published Transactions, which will bear comparison with those of any similar society, prove that there is a deeper current of research running strongly below the surface, and that the scientific character of the Club is well maintained. But even those who attend the excursions of the Society mainly for a day's pleasure, may easily bring home with them emotions of a nobler kind, which will influence them profitably for many days. To those who live in crowded cities it must be always a source of inexpressible delight to be brought face to face with the beautiful scenes our "north countrie" presents in such abundance. And when it is remembered that the places selected are always chosen, because they are known to combine the greatest number of interesting objects, lying within a convenient distance, it is obvious that the Club affords advantages to those who love nature which it would be very difficult, if not impossible, for individual members to provide for themselves. But I think we should not, in summing up the beneficial results of the Field Club, confine ourselves to mere considerations of variety and amusement. We may take higher ground and persuade ourselves, that in the bright sunshine, by the side of some sparkling river, on the breezy fell, or the secret top of some mountain, or most of all, on the wild and rocky shore of the ocean, they that have eyes to see and hearts to feel will be conscious of deeper thoughts. The signs of life in such variety and gladness all around will bring to mind the giver of life, and a holier presence will be recognized, and thoughts be awakened that will not die.

Nature, it is true, is not God. "Quamvis enim nihil esse possit sine ipso," says Augustine, "lamen non sunt quod ipse." (Aug. civit Dei, Lib. VII., p. 219.) But God is to be traced and discovered in nature. Even one of those wonderful old heathens could see in natural beauty the fruits of divine love;

> "Tibi suaves dœdala tellus
> Submittit flores, tibi rident æquora Ponti
> Placatum-que nitet diffuso humine cœlum."

And what the heathen poet feeling after truth so well expressed, the apostle, as was to be expected, has declared with more authority, affirming of the great first cause, "that the invisible things of Him, even His eternal power and Godhead, from the creation of the world are clearly seen, being understood by the things that are made." We seem to find God easily in the varied aspects of nature. When contemplating any scene of natural beauty the sequence of thought is happily expressed by our great poet, when he represents our first parents looking forth upon the external world and saying,

> "These are thy glorious works, parent of good,
> Almighty! thine this universal frame,
> Thus wondrous fair;—Thyself how wondrous then!"

I trust that one good result to follow from the establishment in Newcastle of a College of Science may be to encourage in young people a love of nature. This, besides being a source of unalloyed pleasure and of never failing interest, seems naturally, as we have seen, to lead to the love of God, and so to happiness. Those who can succeed in inspiring young people with a taste for such studies may be numbered amongst their benefactors. No fear then of time hanging heavy on hand, or of unemployed hours. Either alone, or with some congenial companion, they will never be at a loss or unamused. Moreover, and this is a legitimate object of ambition, not without its attractions for the young, there is no one of observation who may not expect to add something of value to the sum of human knowledge. The boundaries of science are now so extended, and still extending, that no man can hope, or even attempt to reach them all, and perhaps we shall never see a modern Pliny; but there is no one possessing habits of observation and perseverance, who, if he chooses for himself some field of congenial study not too widely extended, and examines with patience and in detail the objects before him, letting careful study precede theory, not neglecting what others have made known, but at the same time giving full scope to intelligent observation—whosoever woos nature in this faithful way will not go unrewarded. He will find out things new, and clear up things before obscure or apprehended imperfectly. Nature is so vast a domain, that there is open to every one a field of independent study, rich in results, and inviting us everywhere to enter and enjoy.

But apologizing for thus perhaps wandering from my subject, I proceed to give some account of the excursions of the Club during the past year, 1873.

The First Field Meeting was held in May, at Holywell Dene. The day being fine a party, numbering sixty or seventy, met at Backworth, from whence they walked to the dene. The foliage of the trees was a month behind its usual time, and so the aspect of the scenery was less agreeable than usual. On reaching the Hartley Water Mill the party left the dene and went to Seaton Delaval. Mr. Chapman, the steward, here, kindly showed us round the hall, pointed out the various pictures, and described the works of restoration so far as they have gone.

The old Norman chapel was next visited with its memorial pennons and old armour, and then the members proceeded to Seaton Sluice, which presents rather a desolate appearance since the closing of the bottle works. From Seaton Sluice we went across the Links and over the rocks to St. Mary's Island, where a most bountiful tea was provided by Mr. Ewens. After tea about a dozen new members were admitted. Papers were read by the Secretary on behalf of the author, Mr. T. J. Bold, "*On the Entomology of* 1872," and "*On the Occurrence of the Dotterel in the neighbourhood of Newcastle.*" The Rev. R. F. Wheeler, Vicar of Whitley, also read an interesting paper, entitled, "*A few Historical Notes on Cullercoats, Whitley, and the Neighbourhood,*" giving an account of the descent of the property in Cullercoats and Whitley from the Delavals, who were its possessors in 1606 down to 1700, when the Duke and Duchess of Somerset, the latter I believe heiress of the great house of Percy, leased to John Atkinson for twenty-one years the collieries in Whitley, and also all that pier and quay lately erected at Cullercoats.

The SECOND FIELD MEETING of the year was held on Tuesday, June 24, when the weather was again most favourable. About forty members left the Central Station, Newcastle, at 10·30 A.M. On arriving at Hexham we proceeded to the old Abbey Church where the Vicar, the Rev. Mr. Barker, pointed out features of much interest, including the ancient Saxon crypt, and the Frid stool in the chancel, perhaps a memorial of St. Wilfrid, through whom it appears that the privilege of sanctuary was obtained for the church of Hexham. We then walked to Dipton Dene, some of the party turning aside to visit Queen Margaret's cave, which, though romantically situate, retains at the present day no marks of occupation. The members then proceeded by the Devil's Water to Dilston Castle, standing amidst beautifully green and richly timbered fields. Here they were most hospitably received by C. G. Grey, Esq., and arrived at six o'clock at Mrs. Blandford's comfortable Inn at Corbridge, where tea was provided. No new members were elected, or papers read, on this occasion.

The THIRD FIELD MEETING of the Club was fixed for Wednesday and Thursday, July 16th and 17th, at Whitby, for which place seven members started on the 16th from the Central Station at 8·30 A.M. This excursion was to occupy two days, and Whitby was expected to be reached at about one o'clock. The second day's programme was to be drawn up after dinner. *One* new member was elected on this occasion. Few plants appear to have been gathered during the excursion; but Mr. Joseph Cobb, of Sunderland, records his meeting with the rare *Carex pendula*, one of the finest of this extensive genus. He observes that it grows four or five feet high, with graceful pendulous fertile spikes, and fine broad ribbon-like leaves.

In the absence of more detailed information we may assume that the members visited the quaint old fishing and ship building town by the Esk side, as well as enjoyed the more modern comforts of the new town on the cliff. Perhaps I may conclude also that they did not return without some of St. Hilda's petrified serpents, or specimens for those at home of Whitby's jet ornaments.

The position of the ruined Abbey of Whitby is a great contrast to those usually selected with such taste and care by the enterprising monks seven or eight centuries ago. In their foresight as colonists and civilizers, as well as men devoted to the service of God, they usually chose for their habitation places where running water, and if possible wood and shelter, could be found, and the cultivation of a not unfriendly soil might go hand in hand with the work of the church and the school. But perhaps the very early foundation of this abbey in Saxon times, when ruder and it may be hardier modes of life prevailed, may have led to the choice of this spot, which when once occupied was not afterwards abandoned.

It is interesting to compare the existing ruins of the abbey with those of another abbey erected about the same time, that of Rievaulx, near Helmsley. While the architectural mouldings in the latter are in many parts perfectly sharp and fresh, at Whitby, owing to long exposure to tempestuous weather, the stone is often quite crumbled away. A fine collection of the fossils of Whitby, and those of the Lias formation generally was, if it is not still, carefully preserved at Lartington Hall on the Tees, the fruit of the devotion to geology of the late Mr. Henry Witham.

On a future occasion this part of Yorkshire might be searched for several interesting plants: for example, the *Cornus suecica*, very rare in England, and the still more rare *Convallaria bifolia.* Between Egton and Whitby, by the Esk side for several miles, the wild Daffodil (*Narcissus pseudo-narcissus*) grows in the greatest profusion.

The Fourth Field Meeting of the season was held on August 4, at Barnard Castle. Notwithstanding the unfavourable weather which prevailed early in the morning, about sixty ladies and gentlemen started by the half-past eight o'clock train, and alighted at the Bowes Station, a little to the west of Barnard Castle, shortly before noon; where the company was met by the Right Honourable T. E. Headlam.

After visiting Bowes Castle and the Roman station they walked to Gilmonby Hall, the residence of Mr. Headlam, and then to the upper valley of the Greta, after which they turned down Deepdale and walked back to Barnard Castle. The weather during the afternoon was very fine, and the walk, especially through Deepdale, was much enjoyed. A portion of the party visited the ruins of the old castle at Barnard Castle. Dinner, unfortunately for only a limited number, was provided at the Hing's Arms Hotel, and afterwards a meeting was held, Mr. G. C. Atkinson presiding, when seven new members were elected. The visitors returned to Newcastle by the half-past five train. Mr. Cobb speaks of the great beauty of the *Vicia sylvatica* in Deepdale, and observes how "it climbs over the underwood, festooning it with its lovely racemes of white flowers, delicately pencilled with purple." *Paris quadrifolia* and *Pyrola media* were also met with in abundance, as well as *Melica nutans* and *uniflora,* in the wood at Barnard Castle.

The Fifth Field Meeting of the Club was fixed for September 4th, and its object was to visit Crag Lough, and to follow the line of the Roman Wall. The party, numbering about twenty-five, left Newcastle by the 6.25 train for Bardon Mill. Under the guidance of the Rev. Dr. Bruce they mounted to Chester Holme, which, with its numerous sculptured stones, they were permitted to examine, through the kindness of John

Clayton, Esq. The next point made for was Crag Lough, and from thence the visitors proceeded along the Roman Wall to Housesteads (Borcovicus) and to Sewing Shields. The Anchor Inn, at Haydon Bridge, was the termination of the day's excursion, where ample justice was done to a good dinner. Two new members were elected afterwards, and the party returned to Newcastle delighted with the scenery, the weather, and the erudition and urbanity of their experienced and kind guide.

The last Field Meeting of the year was held at Marsden, on October 9, but owing to the prevalence of a cold boisterous wind, and the fall of several heavy showers, the day was by no means agreeable for an exploration amongst the high cliffs of the coast. All things considered, however, the attendance was a very good one, and as the visitors were precluded from enjoying themselves by a vigorous search for specimens, they were compelled to rest contented with friendly and scientific conversation indoors. An excellent tea, served in the well-known hall in the rock, was much relished, the Rev. G. Cooper Abbes presiding. A friend who accompanied me, and was compelled, like myself, to leave Marsden soon after four o'clock, in order to get home the same night, and who had been much in the West of England, remarked that he had seen nothing in Devonshire or Cornwall finer than Marsden in the way of rock scenery. Certainly in the early part of the afternoon the rocks showed remarkably well, the peculiar creamy tint of the Magnesian Limestone giving them a rich and most pleasing appearance, making them an excellent subject for an artist. After tea, Mr. E. C. Robson, of Sunderland, exhibited drawings of some ancient British vases, which had been found in the course of excavation at Humbledon Hill. They seemed to be hand-made, dried in the sun, and contained what appeared to be the burnt bones of some human being. They were found near two skeletons of great size, and as specimens of antique pottery were of great interest and value.

This concluded the Field Meetings of the year, and never having attended any of the meetings, to my shame be it spoken, previous to holding my present office, although I have been an unworthy member of your Club for the last twenty years, I can truly say, at the close of my year of office, that the impression left on my mind is most pleasant and agreeable; but not unmixed with regret that, owing to my distance from Newcastle, I was not able to be present more frequently. It is a disadvantage to your President when he resides so far from the Central Station, as to be obliged, if he would attend the Field Meetings, in many cases to leave home the day before. The past year, as was to be expected, has not passed away without both its losses and its gains. It does not become one who had not the honour of his acquaintance to do more than allude to the great loss which science in general, and Newcastle in particular, has sustained by the lamented death of Mr. Hancock. His scientific attainments have been acknowledged and done justice to by others far better qualified to speak of them than I am, and I sincerely trust that the plan for the establishment in Newcastle of some suitable and honourable memorial of Mr. Hancock's labours may be successfully and speedily carried out by his fellow-townsmen and all those interested in scientific investigations.

I beg also to be permitted to refer, and with sorrow, to the death of a member of your Club, known possibly to some who are present, Mr. James Ward, formerly of Richmond, in Yorkshire, but who died last year, at the age of seventy, at Redcliffe House, Barton on Irwell, near Manchester. There were few botanists in the North of England so well acquainted with the British plants as Mr. Ward. He had been, as I can testify, for more than fifty years a persevering student, and no department of British botany was neglected by him. He attacked and mastered, too, all the more intricate *genera*. His knowledge of the *Carices*, *Rubi*, Roses, and *Hieracia*, was profound. His large collections will I trust find their way to some public institution; for his great exactness made all specimens named by him valuable as authentic. A large herbarium, mainly due to his exertions, the specimens being named or verified by him, and containing not much under one thousand species and varieties, collected in the neighbourhood of Richmond, is in the possession of the Naturalists' Club there, and must be of infinite use to the members who prosecute botanical studies, for there can be no greater help, especially to younger students, and nothing that can tend more to stimulate exertion, than such an opportunity of referring to correctly named specimens. My lamented friend had for years paid great attention to the willows which abound on the picturesque banks of the Swale. To Mr. Ward and the late Mr. Borrer are chiefly due any merits belonging to the "Salietum Britannicum Exsiccatum" published by me now many years ago. For the last year or two, after a long cessation of correspondence, I often consulted him, by sending him specimens, and always with advantage to myself. Our frequent correspondence during the last years of Mr. Ward's life must have been of the nature of a presentiment on my part of his removal ere long from amongst us;—"Quasi jam divinarem," to quote the words of Cicero, "illo extincto fore unde discerem neminem." Mr. Ward was a great sufferer latterly from a form of rheumatism called carditis, but his love of plants lasted as long as life, and I well remember the delight with which he received from me a specimen of the new *Ammophile Baltica*, which I went to Ross Links on purpose to gather.

We have also to regret the loss of two distinguished names from our list of honorary members, the Venerable Prof. Sedgwick, one of the fathers of English geology, whose lectures I myself attended with delight, at Cambridge, forty years ago, and the accomplished naturalist, Prof. John Phillips, of Oxford. And nearer home the Society has to lament the death, at Florence, of Mr. Joseph Watson, Jun., of Gateshead, a member of the Committee of the Club, and an enthusiastic naturalist. These are painful reminiscences belonging to the year that is past. I pass on to more cheering thoughts.

The spirit of discovery was at no former period more active. The great Nile problem, reaching back to the days of Ptolemy, will no doubt ere long be fully solved, and perhaps as indicated by that great geographer so long ago. Yet it is a melancholy thought that the illustrious Livingstone has not lived to report the completion of his heroic and lengthened labours in the exploration of that wonderful entanglement of lakes and rivers constituting the great Nile basin. Who does not grieve that the final solution should be reserved for others, that the devoted traveller and missionary should be robbed of the reward of his labours? But it has been truly said that a man's work is not to be measured by what is achieved in this world and during one lifetime. If through his self-sacrificing spirit the abominable slave trade in Eastern and Central Africa should, as we hope, be extinguished, none can say that his life has been lost in vain, or his work not well and nobly done.

The great island continent of Australia seems also to be gradually revealing itself to the adventurous spirit of our own race in that vast country. Very recently, Mr. Gorse and Col. Warburton, starting from the line of the telegraph running from Adelaide to the north coast, have successfully conducted expeditions through wide regions in the interior, the latter having, with the help of a camel train, travelled over a thousand miles of longitude through country previously quite unknown. The former, besides meeting with a large lake and a great extent of rich land, discovered an immense isolated pyramidal hill; a monolith of conglomerate, attaining the altitude of eleven hundred feet, six or seven miles in girth, and having copious streams of water flowing from its centre. Both travellers were on their way towards Perth, in Western Australia, but Col. Warburton only was enabled, by the help of his camels, to accomplish the whole distance.

The voyage of H. M. S. "Challenger" brings us, from time to time, topics of not less interest. The occasional reports of the progress of the vessel have no doubt attracted the notice of most of the members of the Club, and we look with the liveliest expectation to the conclusion of the voyage and the publication of its results. These, as now known, have become so numerous that it is difficult, on the present occasion, even to select from them. When collected and classified they will probably throw such a light upon the domain of old ocean, as will enable us to map out its boundaries and the configuration of its bottom, and to localize its inhabitants with a precision hitherto unattainable.

Some of the ascertained facts are already sufficiently surprising, and I cannot refrain from referring to one or two of these which may not perhaps, appearing as they have done at uncertain intervals in the public journals, have caught the eye of all the members of our society.

"The sectional soundings obtained in the North Atlantic proved that a dividing ridge extends down the middle of the sea from Greenland and Iceland to the South American coast, in the neighbourhood of the mouths of the Amazon, embracing the volcanic region of the Azores or Western Islands, and having nowhere more than two miles depth of water. To the eastward, separating it from the coast of Europe and Africa, is an extensive valley, with a depth of two-and-a-half to three miles, stretching from the equator northwards to about the latitude of Ireland, where it rises to the level of the dividing ridge. If this valley were dry, the magnificent view it would present is quite inconceivable, as, on its way north, it passes close to the western foot of the then gigantic mountains of the Cape de Verde and Canary Islands, the latter being towered over by the Peak of Teneriffe, which, rising in one grand and glorious slope, carries its proud head at the enormous height of twenty-six thousand feet above the valley. Between it and Madeira, only two hundred and fifty miles further north, a deep gorge runs up to the eastward, towards the Mediterranean. Thus Madeira standing at the fork between the two valleys commands them from an altitude of twenty thousand feet.

"On the western side of the Azores plateau a vast slightly undulating plain extends towards the American continent, with a mean depth of water of two-and-three-quarter miles. In the bight formed by Newfoundland, America, and the West Indies, the isolated, solitary, and probably volcanic peak of Bermuda, which is now only two hundred and sixty feet above water, rises a lonely colossal column, fifteen thousand feet above the plain, commanding the view over the mighty amphitheatre, whose least radius is five hundred miles."

Such will be the grand physical features of the Atlantic basin if the day of the literal fulfilment of the words "there shall be no more sea" should ever arrive. Passing from such grand cosmical topics to some of the not less interesting but minor results of the expedition, we find that dredgings between Cape Palmas towards the Brazilian coast prove that the inhabitants of the deep water care little for geographical boundaries. Finding a similar suitable temperature, at the equator or the poles, they spread themselves about the whole bottom of the sea; the species found here in the tropics being much the same as these found off the European coasts and elsewhere. Near the surface the case is altered. As the temperature varies so the fauna changes.

A very remarkable discovery has been made of a deep water cold current, only half a degree above the freezing point of fresh water, running to the northward, along the Brazilian coast. Thus the water of the North Atlantic is fed from the Antartic Sea. During the voyage of the "Challenger," between the continents of Africa and America, from the ooze or mud of the sea bottom were brought up by the dredge miniature creatures exactly similar to organisms found in the secondary strata. If this *be* so, the fact seems to call for the attention of the believers in the Development Theory. Assuming the Law of Evolution to be a law of nature, we see here another law restraining development under circumstances apparently not unfavourable, and acting through an inconceivably long period, during which any amount of specific change might, according to theory, have been looked for. As a pendant to this it may be mentioned that blind crustacea seem to belong to the western world. These dwelling on this side appear to require all the eyes they can obtain, for, says the gentleman who reports the scientific proceedings of the ship, we have now found a shrimp having four eyes; probably its original eyes could not see round the corners of its body, so an additional pair have been developed, and, curiously enough, on the knee joints of its front legs, the sight from which can converge across its tail, and so insure its never being caught napping on any occasion.

The question of hybridity in plants has lately attracted a great deal of attention, though less in this country than on the Continent. The idea that the slight differences observed in the plants forming some of our larger genera are due to hybridization, has produced, I think, an injurious effect upon the study of the willows especially. Hardly any one now will be at the trouble to make them out. They repel instead of attracting the botanist, and the genus is regarded as a mass of shifting and unstable forms defying description, or, when described, incapable of satisfactory recognition. That willows vary cannot be denied, and if the range of variation was once determined, we should then know better than we do now what constitutes a species. Too little allowance seems to have been made of late years for the influence of soil, climate, exposure, and such like possible causes of change. A different course, not with the happiest results, has been adopted. Whem forms occur intermediate between other forms hitherto recognized as species, the difficulty is got over by the ready explanation that the intermediate form is a hybrid. It is entered in some book, branded with a dagger or a cross, sometimes further punished by the addition of two names, like the spurious issue of an unlawful union, thus pointing it out to be skipped by the student as a sort of botanical nonentity that may or may not occur again. That hybrids may exist in nature I am by no means prepared to deny; but it appears unphilosophical to conclude that a plant is a hybrid, without experiment, mainly because we do not exactly know what to do with it; and I think a student of nature may object to be told by authority that a plant is undoubtedly a hybrid, though no valid reasons are assigned. That learned and most industrious student Wimmer, in his work on the European Willows, speaks as if an eye for hybrids may in time be acquired. "Huic rei quum per longam annorum seriem operam dedissemus effectum est tandem, ut quid salicis species esset, quid non, ipsi nobis statuere posse videremur." A mode of determination which, however cautiously employed by its author, is not calculated to convince those who are not already believers in the theory. For the last two years I have for my own satisfaction been prosecuting such enquiries, and I hope to do so on a larger scale. I wish I could induce some of the members of the Tyneside Club to undertake similar experiments. I have already four seedling plants raised from the *S. tenuifolia*, Borr, which I hope may flower this year, and shew their amount of variation if any.* I have other plants also but a year younger, growing at Cresswell, raised from *S. pateus*, Woburn; *S. Doniana*, Sen.; a monœcious willow, brought from Rothbury, probably self-impregnated, and from some more. There are many curious questions which such experiments would help to determine. For example, how far natural hybrids (for I have purposely selected those for experiment of which I possess only one sex) differ from their female parent (the name of which ought always to be carefully attached to the seedlings), whether the produce consists of males or of females, and in what proportion; whether, and under what circumstances, monœcious seedlings may be raised, either from a diœcious parent, or from one containing both male and female flowers. It would be interesting if the male plant could be raised in cases where at present no male is certainly known, as in *S. acuminata*, Sm., and to ascertain how far it resembles or departs from its known female parent. Such enquiries (and others, doubtless, will suggest themselves) could not fail to give valuable results. The experiments might be extended to artificial hybridization, as has been chiefly done abroad with the most persevering patience. But as the main question relates to the existence of hybrids in nature, it seems far more important, in the first instance at least, to enquire what is the amount of variation in seedlings naturally produced from known mother plants, the male, of course, being either unknown or traced conjecturally by the departure of the offspring from the characters of the mother plant and resemblance to some male growing near. Of those who have studied this question of hybrid willows no one seems to have done so more thoroughly than a Silesian botanist, Herr Max Wichura, now, I believe, deceased. An interesting account of his experiments is to be found in a paper translated from the German by the Rev. M. J. Berkeley, and published in the Transactions of the Horticultural Society of London. Perhaps I shall not weary my hearers if I endeavour to give a short account of the results as

* One of these I may mention has flowered this year, and proves to be a male *tenuifolia*, of which I had no example before.

there stated. Wichura was led by his friend Dr. Wimmer (already, from observation, a believer that many doubtful willows were hybrids) to institute a series of experiments extending over the years 1852 to 1858. The mode of procedure was this. The great object being to exclude all pollen but that of one kind, cylinders were made of thin tarlatan, from two to three inches wide and six to twelve inches long, furnished with a string at either end to tie them closely to the branches, and strengthened in the centre to prevent them collapsing. After the artificial impregnation was complete, as soon as the stigma dried and the ovary began to swell, the cylinders were removed, and only replaced when the seed was ripe, to prevent it being blown away. The pollen was applied with a camel's hair pencil, a separate pencil being used for each kind of pollen. The seeds of willows germinate very rapidly. Wichura says that the cotyledons make their appearance in from twelve to twenty-four hours. I have not myself found the growth of the seeds nearly so rapid as this. In about a month or three weeks the seedlings have become about an inch high. Wichura speaks of sowing in May. I have not found the seed ripe until June. Wichura's plan was to raise the plants in pots, which could be supplied with water from below. They were allowed to remain till they were some inches high, and then transplanted into the open ground; and thus plants sown in May, he says, obtained a height of two or three feet by the end of summer. I have seen nothing like this, and very possibly the summer climate of the Continent being warmer than ours may account for the difference, for a height of six or eight inches is the most that I have seen in one season. The smaller kinds generally flowered in three years. The arboreous kinds require four years or more. In one instance a plant sown in June produced flowers when ten months old.

In willows it would appear by Wichura's experiments that in about four years, by artificial impregnation, one species can be converted into another. In the absence of examples we must be content to accept the statement that there was a real conversion of one species into another. I am obliged by limits of time and space to refer you to Mr. Berkeley's paper for very curious details of crossing and intercrossing, and the singular readiness with which species far removed from each other, such as *S. Lapponum* and *S. purpurea*, *S. viminalis* and *S. daphnoides* combined to produce seedlings.

Another point of great importance is the imperfect nature of hybrids. In hybrid willows the pollen is less regular than that of pure species, that is to say, it is less regular in form. The pollen of almost all the European willows is said to be remarkable for its great regularity.* One grain is almost perfectly like another in size, colour, constitution, and form. Pure species are thus distinguished from hybrids, in whose pollen there are always some that are abnormal. A tolerably correct opinion, therefore, may be formed of the comparative fertility of hybrids from the examination of the pollen. Pollen grains of willows were treated with a solution of honey (as much as would lie on the point of a knife), mixed with two ounces of water, and it appeared on microscopic examination that the normally formed grains of hybrids, of a light colour and semi-transparent texture, constantly developed pollen tubes. Fresh pollen placed in this mixture frequently began, in the course of ten or twelve minutes, to put forth pollen tubes.

Amongst willow hybrids traces of a defective feeble development are far more frequent than rankness of growth. Wichura gives an enumeration of many hybrids which languished miserably for a few years, and then eventually died out. The possibility must therefore be allowed that the vegetative growth of other seemingly strong hybrids (such as *S. rubra*, Huds., said to have been proved experimentally to be a hybrid between *purpurea* and *viminalis*) is essentially weak, so as to prevent them in the Darwinian struggle for life from competing with the parent species. If all these circumstances, Mr. Berkeley observes, are combined with the imperfection of the pollen, and the partial sterility of the ovaries, the comparative defect of vital energy in hybrids may be looked upon as proved. Nor does the luxuriant

*I find that the easiest way to procure pollen is to gather the catkin-bearing shoots before the anthers have begun to discharge their contents. They open well if kept in water for a day or two in the house.

growth of some contradict this, as it is known often to accompany suppressed fertility. The most fruitful hybrids are always less so than their parents. The weakness of the generative organs in very luxuriant hybrids induces an increase of vegetative growth, while this is not the case in others which are too weak to exhibit such a reaction.

It is an interesting question whether the paternal or maternal parent has most influence upon the form of the hybrid. A curious statement bearing upon this is quoted from Gœrtner, that the most perfect equality of production prevails. Seeds arising from the impregnation of either parent, it is stated, produce plants of the most complete resemblance. Whether the female of *S. caprea* be crossed with the male of *S. viminalis*, or the male of *caprea* with the female of *viminalis*, the resemblance of the offspring was so perfect that they might be taken for products of one and the same crossing. It does not, however, follow that in hybrids the sexes occur in equal proportions: it is not so in nature, and it is an unsettled point as yet in the artificial production of hybrids. It is stated, as the apparent result of Wichura's experiments, that the pollen of hybrids has a tendency to produce varieties: and on the other hand, that of pure species to lead to uniformity in the offspring. It is observed that diœcious plants, which are subject to fertilization by insects, must necessarily produce hybrids, if they comprise, like willows, a great number of nearly related forms, growing in company, and having nearly the same time of flowering. But this seems to assume first, that seedling willows are numerous; second, that they are able to hold their own in the struggle with more vigorous forms; and third, that the pure species do not vary much from well established types. Wimmer believes that there are thirty-four or thirty-five pure European species of willows. Perhaps we might put our British species, omitting varieties, at about twenty-six or twenty-seven. From Wimmer's thirty-two species with hybrid-producing power sixty-six indubitable binary hybrids are known, but this statement must, I think, be received with caution, until fuller evidence is given in each particular case. After enumerating various causes bearing upon the production of hybrids, the journalist remarks, from all these circumstances it is clear that spontaneous hybrids (and that is the main question for botanists to consider) must be rare, yet Wimmer (page 46 of his work) states it as his conviction "multas hybridas salices sponte suâ nasoi," which I suppose we may call natural hybrids. So that whether spontaneous hybrids are to be regarded as rare or frequent would seem doubtful. We come now to general considerations. After first very briefly stating Mr. Darwin's theory of the origin of species, Wichura makes some remarks upon hybrids in general. Perhaps in every male (hybrid I presume) there is some weak point, however strong it may be in other particulars. The hybrid, then, comes with no new peculiarities into the world: it has these of its parents, and generally in less complete degree, so, it is added, the hybrid can never be perfectly accommodated to outward circumstances. From this it would seem to follow that in the struggle with those that are so accommodated the hybrid can have little chance of permanence.

An important observation (as has been before remarked) is that the products arising from reciprocal crossing in plants, unlike those formed amongst animals, are perfectly alike. It is of no consequence which is the male and which the female parent. It is, therefore, certain that the pollen cells must have the same part in the act of generation as the ovules. It is said that irregularity of pollen in cultivated plants favours variability, and that "if gardeners, in the raising of new varieties, would have recourse to the microscope, and let those individuals remain for seed which have the most irregular pollen, or if they would use the most irregular pollen in artificial impregnation, they would, in all probability, materially expedite the accomplishment of their wishes." Mr. Berkeley observes, in conclusion, that this remarkable position results that imperfect accommodation, gives to an organism an increased tendency to form varieties. But the question for us (not as gardeners but as botanists) is, does the same law prevail in nature? Organisms which at any former time were adapted to climate and situation must, when change of condition takes place, gradually cease to be accommodated, and thus the persistence would be endangered. If variability, however, increased with increased disaccommodation, there might be one amongst the many variables which, suited to the new conditions, would have full scope, and might continue to exist, while the others less accommodated would disappear. There are two ways in which this might occur: change in combination with "natural selection," might be the agent; or, which will appear to some a preferable supposition, matter endowed with life might, in consequence of some inherent quality, be able to accommodate itself to outward circumstances.

These interesting speculations will afford ample matter for research, and I trust that some member or members of the Club will be induced to prosecute such enquiries, and by observation and experiment endeavour to throw additional light upon this question of hybridity. Here, then, it is time for me to pause, for I have detained you much too long; I will, therefore, only add how sincerely I wish success to this and other kindred associations. As a clergyman, I would say with confidence that revealed truth has nothing to fear from the true spirit of scientific research. Some traditional interpretations of particular phrases or passages, some received impressions, may need revision in the light of modern knowledge, but as the excavated mounds of Babylonia and Assyria have so singularly borne their testimony to the truth of Bible history, so we may confidently expect to find from scientific research evidence of other kinds, all tending to establish in our minds how safely we may rest upon the truth that holy men of old spake as they were moved by the Holy Ghost. Indeed, if the book of nature and the book of revelation have the same Author, they cannot really be at variance. Only we should remember that it is not the object of Holy Scripture to teach science systematically, or even systematic theology, and that as regards natural objects Holy Scripture often speaks of things not as they are in themselves in their real inner nature and connection, but as they appear to an ordinary observer; and that it is less the object of revelation to explain the laws according to which all things exist, which it belongs rather to the domain of science to ascertain and unfold, than to impress upon mankind the deeply important truth, that the worlds were formed by the word of God, and that things which are seen were not made of things which do appear.

VIII.—*Memoir of the Life of Albany Hancock, F.L.S., etc.* By D. Embleton, M.D.

In acceding to the desire of some of his friends, that I should write an account of the life of Albany Hancock, I have done so with much reluctance, conscious of my unfitness for the office of biographer; but encouraged by the reflection that I had enjoyed his friendship for about thirty years, and been for a time a sharer in his labours, and therefore in a position to form some estimate of his character and abilities, I have attempted the following memoir. Having also previously communicated to the "Natural History Transactions of Northumberland and Durham" (Vol. I., 1867) a notice of the life of the late Joshua Alder, I felt honoured by the request to pay a similar tribute to the memory of our mutual friend, with whom I had been more intimately associated.

Joshua Alder died in January, 1867, at the age of seventy-four years; Albany Hancock in October, 1873, at the age of sixty-seven years.

The linked names of Alder and Hancock, friends and fellow-workers for many years, will long be esteemed as those of good and true men, who, from a pure and unselfish love of science, have done much towards enlarging the boundaries of Natural History, and have shed a lustre on the town in which they were born and spent their lives. Both were self-taught men in their departments of scientific work, and have shown what talent and perseverance can effect even without the aid of academic training. The same may be said in the case of many others of our distinguished men of the North of England.

In a memoir of the lives of men distinguished in any walk of life, or who have left their mark on any department of science, it is always interesting to know their origin, who and what their parents were, under what auspices they were brought up, and whether or not their talents were hereditary.

Nothing now is known of the Hancock family before the time of Albany's grandfather, about the middle of last century. His grandmother, whose maiden name was Baker, was, by the maternal side, a Henzell, a member of the family of that name, who, with the Tyzacks and Tytterys, brought to the Tyne and Wear, and also to Staffordshire, towards the end of the sixteenth century, the important art of glassmaking.*

Thomas Hancock, Albany's grandfather, was a saddler and ironmonger, at the north end of Tyne Bridge, before the year 1771. He had two sons, John and Henry. John, the elder, and father of Albany, was sent to school at Redmire, in Yorkshire, under the Rev. T. Heslop, a clergyman of the Church of England. He showed much ability, and on leaving school joined his father in business. This he pursued more from principle than from love of it, for he used to say, when leaving his young companions for the shop, he "was going to his duty."

When business was slack and the weather fine he was in the habit of making, with two or three like-minded friends, trips on foot into various parts of these northern counties; spending the day in a delightful search after plants, insects, and, especially, shells, in the fields and woods, by the river-sides, or on the rocky promontories and sandy beaches of the coast.

John Hancock and his friends were not, however, the first investigators of the Flora and Fauna of the North of England.

Wallis, in his "History of Northumberland, 1669," had already treated extensively of the Botany and Zoology of this

* These three families migrated together from Bohemia in the thirteenth century, and settled in the Duchy of Lorraine; there they remained three centuries, intermarrying and ranking among the nobility; they were styled "Gentilshommes Verriers."

They were Huguenots, and, at the time of the first persecution of the Protestants in France, migrated in a body to England, bringing their valuable art along with them. See Gentleman's Mag., Vols. CC. and CCI.

county, and given the names of physicians before his time who had largely studied the Botany of the district.

About the year 1780 or 1781 the Tunstal Museum, at Wycliffe, on the Tees, was established by Marmaduke Tunstal, Esq., who also printed a short Ornithologia Britannica. The Museum, in 1791, became the property of Geo. Allan, Esq., of Darlington, from whose executors it was purchased for the Literary and Philosophical Society, in 1822.

Thomas Bewick, the celebrated wood engraver, was offered the the use of the specimens, both by Mr. Tunstall and Mr. Allan, and many of his drawings were made from the specimens of the Tunstall Museum, when at Wycliffe or at Darlington.

His works on Quadrupeds, 1790, and British Birds, 1797, mark an epoch not only in wood engraving, but in the progress of Natural History over the whole country.

Who, especially in his youth, has not eagerly devoured those volumes of Quadrupeds and Birds, in some one or other of their various editions, and learned to love the creatures so faithfully represented in their pages? and, then, the tail-pieces! what a vein of humour and of pathos runs through them, illustrative all the while, as they are, of the scenery, and of the habits and customs of Tyneside men, women, children, and animals, nearly a hundred years ago! Who has not often lingered on them with delight, and returned to them again with renewed zest? It is not affirming too much when it is said that Bewick's books, including the Fables, 1818, and others, have done more to attract and to fix attention and regard to animals than the works of any other author. They have been the delight of boy- and man-hood for three generations, and yet nothing adequate to his merits has been done to honour the memory of this benefactor of mankind.

In this digression on the course of Natural History studies in Northumberland and Durham must not be omitted to be favourably mentioned Selby's "Catalogue of Birds" and his "Illustrations of British Ornithology;" the former published in 1831, the latter in 1833.

John Hancock, and his friends above alluded to, were contemporary with Bewick, but worked in the departments of Botany, Entomology, and Conchology. What they gathered John Hancock studied, named, and arranged, and in a few years had amassed a considerable collection, in which shells predominated.

That he was in advance of his time as a devoted and successful student of Nature this collection and his library demonstrate. The very best standard works of the day were his, and for a quiet provincial naturalist and tradesman, at the end of the last and beginning of the present century, must have appeared extravagantly expensive. The following formed only a small part of his library:—Pliny's Natural History, The Philosophical Transactions, Lister's Synopsis Conchyliorum, Linnæus' Zoological System, Donovan's British Insects and Shells, Bewick's Quadrupeds and Birds. He also possessed one of the best microscopes of that day, and made much use of it. His books, for the most part, bear the marks of study; frequent annotations attesting the work of years. It does not appear that he wrote or published any original papers; but, whilst he advanced year by year in the collection and study of his favourite objects, he instilled into the minds of his children a love of Natural History which to him had been "a continued feast of honied sweets." The older members of his family still remember with affectionate pleasure the manner in which he one day shewed them, in a vessel of clear water, the graceful and beautiful movements of a frog, and pointed out to them how excellently they are adapted for progression in water.

He died at the comparatively early age of forty-three, in September, 1812, leaving a widow and six children, the eldest being eight years of age. Mrs. Hancock carefully treasured up the collections and the books of her husband until her sons were old enough to learn to value them. It was a day of surpassing interest, one which had been eagerly looked forward to, and which will never be forgotten by her children, when the cabinet and bookcase were formally opened for their admiration and use.

Albany, the third child and second son of John Hancock, was born on Christmas Eve, 1806, in the family house at the Bridge End. Losing the paternal example and guidance at the early age of six, he was, with his brothers and sisters, brought up by a tender and excellent mother, who succeeded in fostering their tastes and keeping alive the memory of their father.

Of the six children Albany, John, and Mary afterwards embraced the study of different branches of Natural History and the Fine Arts, and the exigencies of business compelled Thomas to relinquish his inclination for Geology. Thus four of the family appear to have inherited more or less a bias towards their father's studies.

Albany was sent early to the school of the Misses Prowitt, and afterwards to that of Mr. Henry Atkinson, both noted seminaries in Newcastle in those days. In the latter he remained about seven years.

At the age of nineteen he was indentured, and served as an articled clerk, to the late Thomas Chater, Esq., solicitor, of this town. At the end of his clerkship he studied at the office of Thos. Brown, Esq., solicitor, in London, and was afterwards duly admitted as an attorney.

He returned to Newcastle in 1830, and the next year took an office over the shop of his friend, Joshua Alder, in the Side. There he awaited practice for two years; but attracted by the superior charms of Natural History, he quitted the office and the legal profession together.

He was one of the founders of the Natural History Society of Northumberland and Durham (the first part of whose Transactions appeared in 1830), and an Honorary Curator of its Museum, to which, by his application and industry, he rendered essential assistance.

Letters left by him, dated 1832, –33, and –34, from Dr. W. S. Hooker, of Glasgow, and Dr. Johnston, of Berwick-upon-Tweed, show that he and his brother John had formed a project for a work on British Birds, with plates, to be published in quarto; this, having on the whole been disapproved or not sufficiently encouraged, was dropped, though John had already executed some of the drawings for the work. It is much to be regretted that so laudable a project was not carried out.

From about 1835 to 1840 Albany had been turning his attention to modelling in clay and in plaster, and had accomplished a fair bust or two. He also designed and painted fish, flowers, and fruit, thus cultivating and improving the faculties and the tastes he was becoming more and more conscious of possessing, and preparing, without knowing it, for his future work. He delighted in beautiful and tasteful combinations of form and colour, and was a great admirer and good critic of poetry and the Fine Arts generally.

Up to the age of thirty the subject of this memoir seems to have had no fixed object in life. He had withdrawn entirely from business, and indeed the simplicity of his habits and of his whole life made business of little interest to him, and the purity of his tastes and aspirations rendered work which had gain only for its object utterly distasteful to him.

Following the example of their father, Albany and his brothers Thomas and John, together with their friends, Joshua Alder, the Burnetts, William Hutton (joint author with Professor Lindley of "The Fossil Flora"), William Robertson, R. B. Bowman, and John Thornhill, botanists, and W. C. Hewitson (author of "The Eggs of British Birds" and of "Exotic Butterflies"), examined afresh the whole of the surrounding district, making collections of all natural objects. These were the chief men who, with and after Bewick and his predecessors, gained for Newcastle its reputation for the successful prosecution of Natural History.

Albany was one of the principal promoters of the Newcastle Polytechnic Exhibitions of 1840 and 1848, which gave a strong impetus to the diffusion of general information and a love of science among the public of the town and district; and for the acknowledged beauty of arrangement of these displays of art and science much was due to his taste and exertions.

From 1842 to 1864, in association with his friend Joshua Alder, he was engaged in the study of Conchology, and in the discovery of various new genera and species of Nudibranchiate Mollusca of the Northumberland Coast and other parts of the British Islands, and in the delineation and description of their external characters. Up to 1844, they had discovered and described two new genera and thirty-one new species (Rep. Brit. Assoc., 1844), though in the time of Linnæus only six species were known. In these and similar pursuits his powers of minute and accurate observation and correct description appear to have been successfully cultivated, and his talent for delineation by the pencil and the brush fully exercised.

In 1843, Alder and Hancock published, in the Annals of Natural History, "Observations on the Development of the Nudibranchiate Mollusks, with Remarks on their Structure."

About the time of the publication of this paper a change occurred in the direction of Albany's thoughts and studies, which influenced the whole of his future scientific career, and by determining for him a fixed line of investigation, conduced to make him so distinguished an anatomist in Malacology, that his views were afterwards justly regarded as of the highest authority in this department of science, and the most difficult points were at times submitted for his decision. The cause of this change it may not be uninteresting to Naturalists to relate. He had become convinced that valuable for classification as are the external characters and the habits of animals, when carefully observed, it is absolutely necessary to investigate and understand their internal structure also, in order to form a correct idea of their physiology, and of their proper arrangement according to their natural affinities.

In 1843 appeared an elaborate paper by M. de Quatrefages, afterwards a celebrated French Naturalist, in the Annales des Sciences Naturelles, Vol. XIX., entitled "Memoire sur l'Eolidine Paradoxale." In order to estimate duly the value of the work detailed in this memoir, it became necessary that the anatomy of the mollusk concerned should be investigated, and as I was at that time Lecturer on Anatomy and Physiology in the Newcastle School of Medicine, and was acquainted with Mr. Hancock's desires and difficulties, he requested me to join him in the investigation.

A few observations had already been made by Messrs. Alder and Hancock, and the latter had, with his usual acumen, detected some errors in the description of M. de Quatrefages.*

* See "Remarks on the Genus Eolidina, Quatrefages," in the Ann. and Mag. of Nat. Hist., XIV., 1844.

M. de Quatrefages had stated that Eolidina possessed a heart and arteries, but no veins; that, therefore, the circulating apparatus was incomplete, the blood flowing to the heart through a series of open spaces in the areolar tissue of the body; that the mouth had no teeth; that the alimentary canal passing down the median line of the body ended in a dorsal anus, whilst there were given off on each side a symmetrical series of branches, equalling in number the dorsal papillæ, to each of which an offset was given, after which the branches ended in a narrow marginal canal running all round the body.

M. Milne Edwards had (in 1842) declared the existence of a similar apparatus in Calliopœa, and had named it "a gastro-vascular system," believing that the digestive system, by its complexity, replaced in that animal the venous parts of the circulating system, and also the organs of respiration.

On dissecting in 1844 an Eolis, or Eolidina, taken at Cullercoats, we found that veins, as well as arteries, were present; that the mouth contained a spiny tongue; that the alimentary canal ended on the right side of the body, and that there was no marginal canal with which the branches from the stomach could communicate; that the branchial papillæ were the respiratory organs; that, therefore, the functions of digestion, circulation, and respiration, far from being performed by one system only (a gastro-vascular), had each its own special organ.

M. de Quatrefages, in 1844, communicated to the Annales des Sciences Naturelles, t. 1, p. 129, another memoir, in which he attempted, on the strength of his own previous observations and those of Milne Edwards, to establish a new order of Mollusks, to be called *Gasteropoda Phlebenterata.* In this memoir he stated that six genera of Mollusks possess a gastro-vascular system, and that, in fact, the three great functions of life—circulation, respiration, and digestion, are performed in them by one system only of organs, thus degrading these Mollusks to the level of the Acephalous Medusæ; and he, moreover, endeavoured to lay down the vicious principle that the external characters of animals are altogether independent of, and are no key whatever to, their internal structure.

The theory of Phlebenterism, as it was called, was soon attacked, and shown to be false, by a rising young naval surgeon (since deceased), M. de Souleyet, in a paper presented to the Academie des Sciences, in 1844; and Naturalists in England, Germany, and Italy were astonished at the novelty and boldness of M. de Quatrefages' assertions. So important was the discussion considered by the savans of Paris that special commissions for the investigation of the new theory were appointed, by the Academie des Sciences, in 1844, and by the Société de Biologie, in 1849.

Both commissions having examined all producible evidence, including that from Newcastle, reported so diametrically against Phlebenterism, that the very name immediately afterwards disappeared from the language of science.

It was the interest in Anatomy and Physiology inspired by the discussion of this theory that determined Albany Hancock to pursue his researches into internal Anatomy, whilst, at the same time, he paid due attention to external characters; and having once got into the right track of research he never looked back, but pursued the path which led him on to honour and distinction.

We began with the regular study of Eolis in 1844, and in the January following, the Annals and Magazine of Natural History published the first part of the anatomy of this Mollusk, in 1848 the second and third, and in 1849 the last part.

The investigation of Doris, another genus of Nudibranchs, was next undertaken: the results, embodied in a short summary, were communicated to the Edinburgh Meeting of the British Association in 1850, and afterwards a paper "On the Anatomy of Doris," was read for us, in 1851, by the late Professor E. Forbes, to the Royal Society, and printed in the Philosophical Transactions for 1852.

The above-mentioned papers on the anatomy of Eolis contained a more complete description of the organs, particularly those of the digestive, nervous, vascular, and reproductive systems than had up to that time been given, and the degradation to which M. de Quatrefages had condemned these elegant Mollusks was shown to be imaginary.

In the paper on Doris was announced the discovery of the existence in this and other closely allied Mollusks, of the sympathetic or ganglionic system of nerves, and a nearly complete description, with plates, of the extension of this system to all the viscera, in Doris, was given. Up to 1850 no sympathetic nervous system had been described in any animal below the Vertebrata, and it was therefore with peculiar pleasure and care that the ramifications of this system were traced out and laid down. Its presence in these creatures goes to show that the Mollusca are more closely related than the Articulata to the Vertebrata, and that therefore the transition from the Mollusca to these last is not quite so abrupt as has been believed.

During the period from 1845 to 1855 there appeared the justly celebrated "Monograph of the British Nudibranchiate Mollusca, with figures of the species, by Joshua Alder and Albany Hancock." This work, published by the Ray Society, soon gained for its authors a more than European reputation. The descriptions of external characters and the classification were the joint work of Alder and Hancock, most of the drawings of the species and the whole of those of the anatomy were by Hancock alone.

The beauty of the drawings and the delicacy of the colouring exhibited in this work it would be difficult to surpass, and the anatomical details are represented with a perfect fidelity to nature. Albany rapidly surmounted the difficulties attendant on the delicate dissection of microscopically minute parts; in which the breath, even, has to be held and regulated, and the hand educated in the execution of the smallest possible movements; and he readily gained an extensive acquaintance with the principles and details of Comparative Anatomy.

The Tyneside Naturalists' Field Club was instituted in the year 1846, and one of its foremost and best supporters was Albany Hancock. The second paper in its Transactions, that "On the existence of Limnoria terebrans at the mouth of the Tyne," was by him. He afterwards contributed papers "On the Boring Apparatus of the Carnivorous Gasteropods and of the Stone and Wood-burrowing Bivalves;" "On the Boring of the Mollusca, as Teredo, Xylophaga, Pholas, etc., into Rocks, etc.;" and "On the Excavating powers of certain Sponges, as Cliona; with descriptions of several new species and an allied generic form." These remarkable original papers will be found characterized below. Many other valuable papers, each of which is deserving of especial notice, will be found mentioned in the appended list of his works; and he continued his contributions to the Transactions up to the year of his decease. On more than one occasion, and after much solicitation, he modestly declined the honour of being elected President of the Club.

After the completion of the Monograph of the Nudibranchiata he worked alone on "The Organization of the Brachiopoda," and his essay with this title, in the Philosophical Transactions for 1858, is a splendid proof of his talents as an enlightened Naturalist, a philosophical anatomist, and an accomplished artist.

The Royal Society, in acknowledgment of their appreciation of the high value of his works on the Mollusca, and of that on the Brachiopoda in particular, awarded him, in 1858, a Royal medal, an honour conferred on few.

In the address of the President of that year (the Right Hon. Lord Wrottesley) at the Anniversary Meeting of the Royal Society, the following notice was taken of Albany Hancock's labours, on the presentation to him, through Prof. Huxley, of the Royal medal. After a commendatory notice of the papers on Eolis and Doris, the Monograph on the Nudibranchiata is characterised as "a work eminent alike for the beauty and fidelity of its illustrations and the value and completeness of its zoological and anatomical details." And further, "Among the more important of Mr. Hancock's numerous independent contributions to science should be noticed a valuable paper on the 'Excavating powers of certain Sponges;' his discovery and accurate account of a new and curious genus of burrowing Cirripedes, and several others; in all of which is manifested a remarkable capacity for minute and accurate observation conjoined with great powers of generalisation. But in none of Mr. Hancock's labours are these faculties so eminently displayed as in his more recent investigation of the organisation of the Brachiopoda. In his elaborate monograph on this most difficult subject, and of which it may be truly said a more complete specimen of minute anatomy has not appeared since the days of Lyonet, a detailed account is given of the whole organisation of the Brachiopoda, founded upon the laborious dissection of numerous species; several interesting points in their economy, first indicated by Prof. Huxley, are confirmed; many additional facts communicated; and a new and clear light thrown upon the previously obscure subject of the physiological and systematic relations of the class in general."

Praise like this, and from so high a scientific source, could not but be agreeable to our friend, and stamped him as a man of established fame.

He was solicited to become a Fellow of the Royal Society, but declined the honour.

During the progress of the above works his attention was attracted from time to time by various subjects of kindred character, and he made numerous contributions to scientific periodicals; indeed, for thirty years, he scarcely ceased from work: each year, as may be seen in the list of his works at the end of this memoir, bringing forth something of more or less solid utility to his favourite sciences. He worked most perseveringly, taking little rest or relaxation and insufficient exercise; his patience and zeal were indefatigable; his observations were frequently repeated and tested,—whilst his dissections were of necessity performed with the subject under water and by the aid of a lens, and at times required the use of the higher powers of a valuable microscope presented to him by Lady Armstrong. The drawings from his dissections were executed with a delicacy and minute correctness which left nothing to be desired, and the descriptions were always plain and modest, but conscientiously exact, his sole aim being the representation of the truth as it is in Nature. His sight was excellent, his powers of observation and manipulation now perfected, his reasoning close, his generalisations enlightened, and, his mind having risen to its full development, he succeeded in unravelling the intricacies of the organisation of the objects of his researches in so clear a manner as to call forth the admiration of those who, either in this country or abroad, had been educated to the study, and who held the highest places in the ranks of the cultivators of natural science.

During and after the year 1858 he produced numerous papers; with Mr. Alder on the Nudibranchiata, and alone on the Cephalopoda, on the Freshwater Bryozoa, and on Hydra..

In conjunction with Mr. Alder, in 1863, he classified and described, in the Transactions of the Zoological Society, a collection of Indian Nudibranchiata, sent by Walter Elliot, Esq.

With Mr. Howse he contributed valuable papers on the Fossil Remains of the Marl-slate of Durham, and with Mr. Atthey, various descriptions of the Fossil Fauna of the Northumberland Coal Field.

For these last additions to science the authors deserve high credit, and the thanks of all Palæontologists, seeing the lucid descriptions they have given of the remains of the ancient fishes and reptiles submitted to their investigation, and the satisfactory manner in which, with every modesty, they have cleared away a cloud of errors and hasty generalisations of previous writers whereby the study of these interesting relics of a past Fauna had been rendered unnecessarily complicated and difficult.

We now come, lastly, to notice the work which was unfortunately left incomplete at the time of his lamented death, and I have been very kindly furnished by the Rev. A. M. Norman with the following particulars of information as to the origin and progress of the intended Monograph on the British Tunicata, which, it was expected, would form a companion volume to that on the Nudibranchiata.

Mr. Alder had for some years been engaged in the preparation of an Illustrated Catalogue of the British Tunicata, to be published by the British Museum as a companion to the catalogues, by Busk on the Polyzoa, by Spence Bate on the Sessile-eyed Crustacea, etc.

Mr. Alder's catalogue was almost ready for publication, and the plates were prepared, when it was intimated to Mr. Alder that funds were no longer at the disposal of the Trustees for the publication of the work. It now became a question what other means could be found to ensure its publication, and Mr. Alder then communicated with his friend Mr. Hancock on the subject of joining with him in the preparation of a more complete monograph on the Tunicata than had before been contemplated, and for which he proposed that Mr. Hancock should work out the anatomy and physiology in the same manner as he had previously done with respect to the Nudibranchiata.

The Ray Society was next consulted as to whether it would be willing to publish the work thus contemplated. The society having consented, and arrangements having been made, Mr. Hancock at once laid aside other work, namely, "The Anatomy and Physiology of the Cephalopoda," and at once applied his vigorous powers to the Tunicata.

The death of Mr. Alder in 1867 deprived Mr. Hancock of all assistance from one who was thoroughly versed in the literature of the subject, but still, anxious to carry out the wishes of his friend, he laboured assiduously at the difficult task until prevented by increasing sickness.

The first result of these studies was that in 1868 Mr. Hancock communicated to the Journal of the Linnæan Society, Zoology IX., a paper "On the Anatomy and Physiology of the Tunicata." This was only a prelude to the intended monograph, but nevertheless, though a succinct, it is an admirably simple and clear description of the anatomy of many species of Simple and Compound Tunicata, including many points of importance up to that time unnoticed, and ending with a modest hypothetical statement of some of the relations of the Tunicata, with the Polyzoa on the one hand, and with the Lamellibranchiata on the other, showing the great probability there is that "the branchial sac, the endostyle, the oral lamina, the branchial tubercle, and the tentacular filaments of the inhalant tube of the Tunicata, are new and distinct developments, and that all these organs have equally their origin in the lining membrane or inner tunic of Huxley, and have no homological representatives in the Polyzoa;" and further, that "this interpretation of the fact leads to the belief that the branchial sac (of the Tunicata) is the rudiment and homologue of the Lamellibranchiate gill."

This hypothesis is founded upon anatomical data derived in great part from his own investigations, and is supported by such close reasoning and legitimate inference that it appears more like a statement of facts than an hypothesis, and is one of his best achievements.

In 1870, in reply to some observations of M. Lacaze-Duthiers, in the Ann. and Mag. Nat. Hist., July, 1870, and Comptes Rendus, May 30, 1870, on the larva state of Molgula, Mr. Hancock maintained that this Ascidian on emerging from the egg *always* assumes the tadpole-larva form; and in the same paper he took the opportunity to describe about twenty new species of British simple Ascidians, determined by Mr. Alder and himself.

Of the principal work on the Tunicata Mr. Hancock had, up to the autumn of 1873, completed about two-thirds and a portion of the remainder. Ill health overtook him, and he deeply regretted that he was compelled to abandon the valuable work which he so much loved, and which he had so greatly illustrated, when he was within two years of the time when he expected to be able to bring it to a conclusion.

Slowly increasing debility of frame, with dyspnœa and cough on exertion, rendered application to his work too onerous to be continued; even thought on the objects of his study could not be long kept up. Change of air and rest at Sir W. G. Armstrong's hospitable seat at Cragside benefited him from time to time, but he declined more and more through the summer and autumn, owing to dropsical symptoms supervening, and died tranquilly on the 24th of October, 1873, deeply regretted by all who knew his worth.

Albany Hancock kept up a correspondence with most of the leading Naturalists, as his numerous letters and presents of books and pamphlets testify; with Darwin, Owen, Huxley, Hooker, Sharpey, Forbes, Phillips, Allman, Busk, and several other distinguished Naturalists of Great Britain; Cohen, of Breslau; Suess, of Vienna; Kelaart, of Ceylon; Agassiz, of U.S.A.; Lacaze-Duthiers, of Paris; Lovén, of Stockholm; Bergh, of Copenhagen; and others of the Continent of Europe.

He was not without special honours in his own country or from abroad. He was elected, in 1845, a corresponding member of the Manchester Natural History Society, and in 1862 a Fellow of the Linnæan Society.

In 1858, as already stated, he was awarded a Royal medal of the Royal Society of London, and declined the honour of the Fellowship. In 1865 he was elected a member of the Imperial and Royal Zoologico-Botanical Society of Vienna, and in 1869 a correspondent of the Academy of Natural Sciences of Philadelphia, U.S.A., and particularly of the Conchological Section of that Academy.

He never betrayed the least vanity at being thus distinguished, but bore his honours meekly, and never alluded to his success; indeed he rarely mentioned it or his honours to any one, and his diplomas were carefully put away, so as not to attract attention; but he failed not to experience within himself the natural gratification of finding that he had not worked in vain to extend the boundaries of human knowledge, and that his labours were appreciated by those who alone were competent to estimate their value.

Albany Hancock, gifted with a large and well-constituted brain, and trained, as few are, both as a lawyer and a close observer of nature, was a person of philosophic mind; quick and accurate in perception, careful in weighing evidence, correct in judgment, careful and powerful in generalising, and, withal, modest and unassuming. No one could be long in his genial company without feeling that he was in the presence of a superior person. He was fond of intellectual society, which elicited his powers of mind, and in which he bore his part without assumption of superiority. He was not averse from argument, in which he always displayed large views, and an evident desire to arrive at a correct estimation of the matter under discussion; and his opinion once formed was firmly adhered to and difficult to shake. His great general information, his thoughtfulness, and sound judgment were well known, and in many cases of doubt or difficulty his decision was appealed to, with much advantage by others, as well as by the members of his own family. Naturally mild, grave, and contemplative, he was courteous, sensitive, and somewhat diffident. He was kind and sympathizing towards the oppressed, and instances are not wanting in which his warm sympathy for his friends in misfortune or domestic affliction acted as balm to the wounded heart. There was benevolence in his smile and in his tear, and his conduct was marked throughout by purity and uprightness. Children he loved, though he was never married, and was beloved by them. He could partake of their simple joys and sorrows, and was always ready to impart information and teach them to observe with attention the objects around them.

His time was much occupied with his laborious researches and his study of authors on his favourite subjects, nevertheless he kept himself abreast of the current knowledge of the day, not only in Natural History, but in general Anatomy and Physiology, in Archæology, general Literature, and Politics, in all of which, and in the Fine Arts, he took especial pleasure.

The modesty and diffidence of his sensitive nature prevented him from taking part in discussions at public meetings, even on scientific subjects; and though he was solicited in 1850 to give a course of lectures on Zoology or Comparative Anatomy, in the Newcastle College of Medicine, he modestly declined to undertake the task, as one unfitted to his frame of mind.

A list of his works, seventy-four in number, is appended, and on these his after fame securely rests.

The portrait at the head of this memoir, an excellent likeness, is from a photograph by R. B. Bowman, Esq., and nine hundred copies of it have been handsomely presented to the Transactions of the Club by Joseph W. Swan, Esq.

It is hoped that so much of the work on the Tunicata as Messrs. Alder and Hancock had finished may be shortly got ready for publication. Doubtless it will be found in no way inferior to the best of their other works.

LIST OF WORKS BY ALBANY HANCOCK, F.L.S.

1. 1836.—Note on the occurrence of Raniceps trifurcatus on the Northumberland coast. Jardine. Mag. Zool. and Bot., I., 1836, p. 201.

2. 1836.—Note on Falco rufipes, Motacilla neglecta, Regulus ignicapillus, and Larus minutus. Jardine. Mag. Zool. and Bot., 1836, p. 491.

3. 1845.—Note on the Boring Apparatus of the Carnivorous Gasteropods, and of the Stone-and-Wood-burrowing Bivalves. Ann. Nat. Hist., XV.; Silliman's Journal, I., 1846.

4. 1846.—A list of Shells dredged on the West Coast of Davis's Straits; with notes and descriptions of eight new species. Ann. Nat. Hist., XVIII., pp. 323–338.

5. 1846.—Notice of the occurrence of Limnoria terebrans at the mouth of the Tyne. Tyneside Nat. F. C. Trans., I., 1846–50, pp. 31–32.

6. 1846.—Notice of the occurrence, on the British Coast, of a Burrowing Barnacle, belonging to a new order of the class Cirripedia. Tyneside Nat. F.C., I., pp. 327–358; Ann. Nat. Hist., IV., 1849, pp. 305–314.

7. 1846 to 1850.—On the Anatomy of the Freshwater Bryozoa; with descriptions of three new species. Tynes. Nat. F.C. Trans., I., 1846–1850, pp. 367–405; Ann. Nat. Hist., V., 1850, p. 173.

8. 1846.—Notes on a species of Hydra found in the Northumberland Lakes. Tynes. Nat. F.C. Trans., I., 1846–50, pp. 405–415; Ann. Nat. Hist., V., 1850, pp. 281–284.

9. 1847.—Notes on Buccinum undatum. Ann. Nat. Hist., XIX., 1847, pp. 150–155.

10. 1848.—On the Boring of the Mollusca into Rocks, &c.; and on the removal of portions of their shells. Ann. Nat. Hist., II., 1848, pp. 225–248; Froriep. Notizen, XI., 1849; Wiegman, Archiv., XV., 1849.

11. 1848.—Notice of the occurrence of Fossil Fish in the rocks (marl-slate) near the Great Slip-dyke at Cullercoats Haven. Tynes. Nat. F.C. Trans., I., 1848, p. 275.

12. 1849.—On the Excavating powers of certain Sponges belonging to the genus Cliona; with descriptions of several new species, and an allied generic form. Ann. Nat. Hist., III., 1849, pp. 321-348.

13. 1851.—On the anatomy of Antiopa Spinolæ, a Nudibranchiate Mollusk. Ann. Nat. Hist., VIII., 1851, pp. 25-37.

14. 1851.—Notice of the occurrence on the Durham coast of Diphyllidia lineata. Tynes. Nat. F.C. Trans., II., 1851, p. 128.

15. 1851.—Observations on the Nidification of Gasterosteus aculeatus and G. spinachia. Tynes. Nat. F.C. Trans., II., 1851-4, pp. 311-321; Ann. Nat. Hist., X., 1852, pp. 241-248; Newman, Zoologist, XII., 1854, pp. 4409-4417.

16. 1852.—Observations on the Olfactory Apparatus in the Bullidæ. Ann. Nat. Hist., IX., 1852, pp. 188-190.

17. 1852.—On the Nervous System of Ommastrephes todarus. Ann. Nat. Hist., X., 1852, pp. 1-14.

18. 1853.—On the Animal of Chamostrea albida. Ann. Nat. Hist., XI., 1853, pp. 106-112.

19. 1853.—On the Animal of Myochama anomioides. Ann. Nat. Hist., XI., 1853, pp. 287-291.

20. 1856.—Remarks on the Anatomy of the Brachiopoda. Brit. Assoc. Rep. (Pt. 2), 1856, pp. 94-98.

21. 1857.—On the Organization of the Brachiopoda. Phil. Trans., 1857, pp. 791-870.

22. 1858.—Remarks on certain Vermiform Fossils found in the Mountain Limestone districts of the North of England. Tynes. Nat. F.C. Trans., IV., 1858, pp. 17-34; Ann. Nat. Hist., II., 1858, pp. 443-457; Brit. Assoc. Rep., 1858 (Pt. 2), pp. 80-81.

23. 1858.—On a new species of Plumatella; on the occurrence of Fredericella Sultana near Newcastle, and of Laphopus crystallinus in Northumberland. Tynes. Nat. F.C. Trans., IV., 1858, p. 67.

24. 1858.—On the occurrence of Acmæa testudinalis at Roker, on the coast of Durham. Tynes. Nat. F.C. Trans., IV., 1858, p. 68.

25. 1858.—On the occurrence of Teredo and Xylophaga dorsalis on the Durham coast. Tynes. Nat. F.C. Trans., IV., p. 58.

26. 1858.—On a peculiar reticulated appearance of the surface of a clay-bed on the beach near Whitburn. Tynes. Nat. F.C. Trans., IV., 1858, p. 69.

27. 1860-62.—Description of a new species of Naked Mollusca (Limapontia depressa). Tynes. Nat. F.C. Trans., V., 1860-62, pp. 315-317.

28. 1861.—On certain points in the Anatomy and Physiology of the Dibranchiate Cephalopoda. Nat. Hist. Review, 1861, pp. 473-484.

29. 1861.—Note on the occurrence of Acmæa testudinalis at Cullercoats. Tynes. Nat. F.C. Trans., V., 1861, p. 63.

30. 1863.—On the Structure and Homologies of the Renal Organ in the Nudibranchiate Mollusca. Linn. Soc. Trans., XXIV., 1864, pp. 511-530.

31. 1865.—On the Anatomy of Doridopsis, a genus of the Nudibranchiate Mollusca. Linn. Soc. Trans., 1865, XXV., pp. 189-207.

32. 1867.—Note on the Excavating Sponges; with description of four new species. Nat. Hist. Trans. N. and D., I., pp. 337-358; Ann. Nat. Hist., 1867, XIX., pp. 229-242.

33. 1868.—On the Anatomy and Physiology of the Tunicata. Linn. Soc. Journal, Zoology, IX., pp. 309-346.

34. 1870.—On the Larval State of Molgula; with descriptions of several new species of Simple Ascidians. Ann. Nat. Hist., 1870, pp. 353-368.

BY ALBANY HANCOCK AND JOSHUA ALDER.

1. 1842. Description of several new species of Nudibranchous Mollusca found on the coast of Northumberland. Ann. Nat. Hist., IX., 1842, pp. 31-36.

2. 1843.—Notice of a British species of Calliopœa, D'Orbigny, and of four new species of Eolis, with observations on the development and structure of the Nudibranchiate Mollusca. Ann. Nat. Hist., XII., 1843, pp. 233-238; L'Institut. XII., No. 536, p. 119.

3. 1844.—Description of a new genus (Venilia) of Nudibranchiate Mollusca, with some new species of Eolis. Ann. Nat. Hist., XIII., 1844, pp. 161-166; Ann. Sci. Nat., I. (Zool.), 1844, pp. 190-191.

4. 1844.—Remarks on the genus Eolidina, Quatrefages. Ann. Nat. Hist., XIV., 1844, pp. 125-129.

5. 1844.—Descriptions of Pterochilus, a new genus of Nudibranchiate Mollusca, and two new species of Doris (D. flammea and D. mera). Ann. Nat. Hist., XIV., 1844, pp. 329-331.

6. 1844.—Report on the British Nudibranchiate Mollusca. Brit. Assoc. Rep., 1844, pp. 25-29; Baillière, Lond., 4845.

7. 1845.—Notice of a new genus (Eumenis) and several new species of Nudibranchiate Mollusca. Ann. Nat. Hist., XVI., 1845, pp. 311-316; L'Institut., No. 612, p. 338.

8. 1846.—Notices of some new and rare British species of Naked Mollusca.—1. Description of a small Mollusk, belonging to the order Inferobranchiata. 2. Descriptions of some new species of Nudibranchiata. Ann. Nat. Hist., XVIII., 1846, pp. 289-294.

9. 1847.—Notes on British Mollusca, with descriptions of new species. Brit. Assoc. Rep., 1847 (Pt. 2), pp. 73-74.

10. 1848.—Additions to the British species of Nudibranchiate Mollusca. Ann. Nat. Hist., I., 1848, pp. 189-192.

11. 1848.—On a proposed new order of Gasteropodous Mollusca (Pellibranchiata). Ann. Nat. Hist., I., 1848, pp. 401-415.

12. 1851.—Descriptions of two new species of Nudibranchiate Mollusca, one of them forming the type of a new genus (Oithona). Ann. Nat. Hist., VIII., 1851, pp. 290-302; Brit. Assoc. Rep., 1851 (Pt. 2), p. 74.

13. 1851.—On the Branchial Currents in Pholas and Mya. Ann. Nat. Hist., VIII., 1851, pp. 370-378; Brit. Assoc. Rep., 1851 (Pt. 2), pp. 74-75; Ann. Sci. Nat., XV. (Zool.), 1851, pp. 380-381; Fror. Tagesber., No. 538 (Zool. Bd. III.(1852, pp. 11-16.

14. 1854.—Notice of some new species of British Nudibranchiata. Ann. Nat. Hist., XIV., 1854, pp. 102-105.

15. 1843-1855.—Monograph of the Nudibranchiate Mollusca, Ray Soc., 4to, with 83 coloured plates.

16. 1862.—Descriptions of a new genus (Crimora), and some new species of Naked Mollusca. Ann. Nat. Hist., X., 1862, pp. 261-265.

17. 1863.—Notice of a Collection of Nudibranchiate Mollusca, made in India by Walter Elliot, Esq.; with descriptions of several new genera and species. Zool. Soc. Trans. V., 1866, p. 113.

18. The unfinished Work on the Tunicata.

BY ALBANY HANCOCK AND D. EMBLETON, M.D.

1. 1845.—On the Anatomy of Eolis, a genus of Mollusks of the order Nudibranchiata. Ann. Nat. Hist., XV., 1845, pp. 1–10, 77–89; I., 1848, pp. 88–105; III., 1849, pp. 183–202.

2. 1846.—Account of a Ribbon-fish (Gymnetrus) taken off the coast of Northumberland. Tynes. Nat. F.C. Trans., I., 1846–50, pp. 288–310; Ann. Nat. Hist., IV., 1849, pp. 1–18; Newman, Zoologist, VII., 1849, pp. 2460–2462.

3. 1847.—On the Anatomy of Scyllæa. Brit. Assoc. Rep., 1847 (Pt. 2), p. 77.

4. 1850.—Summary of Observations on the Anatomy of Doris, a Nudibranchiate Mollusk. Brit. Assoc. Rep., 1850, p. 124; Tynes. Nat. F.C. Trans., II., 1851–54, pp. 119–128; Edinb. New Phil. Journ., LIII., 1852, pp. 156–160.

5. 1852.—On the Anatomy of Doris. Phil. Trans., 1852, pp. 207–252.

BY ALBANY HANCOCK AND REV. ALFRED MERLE NORMAN.

1862.—On Splanchnotrophus, an undescribed genus of Crustacea, parasitic in Nudibranchiate Mollusca. Linn. Soc. Trans., XXIV., 1863, pp. 49–60.

BY ALBANY HANCOCK AND RICHARD HOWSE.

1. 1869.—On Janassa bituminosa, Schlotheim, from the Marl Slate of Midderidge, Durham. Nat. Hist. Trans. Northum. and Durh., III., pp. 334–357; Ann. Nat. Hist., V., 1870, pp. 47–62.

2. 1870.—On a new Labyrinthodont Amphibian, from the Magnesian Limestone of Midderidge, Durham. Nat. Hist. Trans. Northumb. and Durh., IV., pp. 219–231; Quar. Journ. Geo. Soc., XXVI., 1870, pp. 556–564.

3. 1870.—On Proterosaurus Speneri, von Meyer, and a new species, Proterosaurus Huxleyi, from the Marl Slate of Midderidge, Durham. Nat. Hist. Trans. Northumb. and Durh., IV., pp. 232–242; Quar. Journ. Geo. Soc., XXVI., 1870, pp. 565–572.

4 1870.—On Dorypterus Hoffmanni, Germar, from the Marl Slate of Midderidge, Durham. Nat. Hist. Trans. Northumb. and Durh., IV., pp. 243–268; Quar. Journ. Geo. Soc., XXVI., 1870, pp. 623–641.

BY ALBANY HANCOCK AND THOMAS ATTHEY.

1. 1868.—Notes on various species of Ctenodus obtained from the Shales of the Northumberland Coal Field. Nat. Hist. Trans. Northumb. and Durh., III., pp. 54–66; Ann. Nat. Hist., 1868, I., pp. 77–87.

2. 1868.—Notes on the Remains of some Reptiles and Fishes from the Shales of the Northumberland Coal Field. Nat. Hist. Trans. Northumb. and Durh., III., pp. 66–120; Ann. Nat. Hist., 1868, I., pp. 266–278, 346–378.

3. 1869.—On a new Labyrinthodont Amphibian from the Northumberland Coal Field, and on the occurrence in the same locality of Anthracosaurus Russelli. Nat. Hist. Trans. Northumb. and Durh., III., pp. 310–319; Ann. Nat. Hist., 1869, IV., pp. 182–189.

4. 1869.—Note on Anthracosaurus. Nat. Hist. Trans. Northumb. and Durh., III, pp. 319–321; Ann. Nat. Hist., 1869, IV., p. 270.

5. 1869.—On some curious Fossil Fungi from the Black Shale of the Northumberland Coal Field. Nat. Hist. Trans. Northumb. and Durh., III., pp. 321–330; Ann. Nat. Hist., IV., pp. 221–228.

6. 1869.—On the Generic Identity of Climaxodus and Janassa, two fossil fishes related to the Rays. Nat. Hist. Trans. Northumb. and Durh., III., pp. 330–338; Ann. Nat. Hist., 1869, IV., pp. 322–329.

7. 1870.—Note on an undescribed Fossil Fish from the Newsham Coal Shale, near Newcastle-on-Tyne. Nat. Hist. Trans. Northum. and Durh., IV., pp. 199–201; Ann. Nat. Hist., 1870, V., pp. 266–268.

8. 1870.- On the occurrence of Loxomma Allmanni in the Northumberland Coal Field. Nat. Hist. Trans. Northumb. and Durh., IV., pp. 201–208; Ann. Nat. Hist., 1870, V., pp. 374–379.

9. 1870.—Description of a Labyrinthodont Amphibian, a new generic form, obtained in the Coal Shale at Newsham, near Newcastle-upon-Tyne. Nat. Hist. Trans. Northumb. and Durh., IV., pp. 208-218; Ann. Nat. Hist., 1870, VI., pp. 56–65.

10. 1871.—Description of a considerable portion of a mandibular ramus of Anthracosaurus Russelli; with notes on Loxomma and Archichthys. Nat. Hist. Trans. Northumb. and Durh., IV., pp. 385–397; Ann. Nat. Hist., 1871, VII., pp. 73–83.

11. 1871. —A few remarks on Dipterus and Ctenodus, and on their relationship to Ceratodus Forsteri, Krefft. Nat. Hist. Trans. Northumb. and Durh., IV., pp. 397–407; Ann. Nat. Hist., VII., pp. 190–198.

12. 1871.—Descriptive notes on a nearly entire specimen of Pleurodus Rankinii, on two new species of Platysomus, and a new Amphicentrum; with remarks on a few other Fish-remains found in the Coal Measures at Newsham. Nat. Hist. Trans. Northumb. and Durh., IV., pp. 408–423. Ann. Nat. Hist., 1872, IX., pp. 249–262.

IX.—*Notes on the Occurrence of Lepidoptera in Northumberland and Durham, in* 1874. By WILLIAM MALING.

ON account of the lamented death of my late friend, Mr. Thomas John Bold, who had attained a European fame by his labours and knowledge of Natural History, more especially in Coleoptera, I have been requested to furnish the Society with my Notes on Lepidoptera. I now do so, though I feel myself inadequate to perform the task. For several years Mr. Bold, in framing his Entomological Report, has had the benefit of my Notes, as the severe affliction under which he suffered for many years previous to his decease, rendered him quite incapable of pursuing his studies out of doors.

The mild winter we experienced in 1873–4, followed by the droughty summer, proved not to be favourable to insect life, many larvæ not attaining their full growth, and others not reaching the pupa state. Very few species appeared in profusion; others, generally common, were only met with very sparingly.

DIURNI (BUTTERFLIES).

The Whites (*Pieris brassicæ, rapæ, and napi*).—In the spring appeared in very small numbers, but in July and August (the second brood) they occurred more plentifully.

During a sultry day towards the latter end of July, on the road between Newbiggin-by-the-Sea and Woodhorn, I noticed a great many (at least thirty or forty) *P. brassicæ* and *P. rapæ* settled by the edge of a small stream which crosses the road. Others were hovering about, and did not seem disturbed by my presence, but allowed me to approach quite close to them. They seemed to refresh themselves by absorbing the moisture from the damp soil.

The Orange Tip (*Anthocaris cardamines*).—Was rarely observed on the wing.

The Fritillaries (*Argynnis euphrosyne and selene*).—In smaller numbers than usual.

The Small Tortoise Shell (*Vanessa urticæ*).—In some localities appeared in average numbers.

The Large Tortoise Shell (*V. polychloros*).—Mr. Geo. Wailes, in his "Catalogue of the Lepidoptera of Northumberland and Durham," mentions this species on the authority of the Rev. Mr. Wallis, who published his "Natural History and Antiquities of Northumberland" in 1769. After the lapse of more than a century I have the pleasure to report the re-appearance of this fine butterfly in this county. A specimen was found, on the 28th of March, by Mr. Henderson, on the floor of the chapel of All Saints' Cemetery. It was in a semi-dormant condition, and had no doubt hybernated among the rafters of the chapel. I believe the neighbouring county of Durham can only boast of two instances in which it has been met with, namely, at Whitburn, on July 23rd, 1858, by Mr. John Hancock, and by Mr. Sang at Darlington, but I do not know the date.

The Camberwell Beauty (*V. antiopa*).—This beautiful butterfly was seen, but not captured, by the same person, to whom I am indebted for the specimen I possess, and who took it in Jesmond Dene, in August, 1872. It appeared on the 11th of September, within a few yards of the spot of the former capture. The food plant of the larva is plentiful in the neighbourhood. I think we may now safely conclude they are natives, and not flown-over specimens.

The Peacock (*V. io*).—Was only met with on two or three occasions; but Mr. Hedworth, of Dunston, found two broods of the larvæ on stinging nettles, from which he reared fifty or sixty fine specimens.

The Painted Lady (*V. cardui*).—I have not met with either larva or imago of this species, which in some seasons is very abundant.

The Gatekeeper (*Satysus tithonus*), *Meadow Brown* (*S. janira*), *Small Heath* (*Chortobius pamphilus*), and the *Common Blue* (*Lycæna alexis*) were represented rather sparingly during the season.

The Lilac Blue (*L. argiolus*).—I have heard of no captures during the season.

The Small Copper (*Polyomnatus phlœas*).—This beautiful little butterfly, usually common and widely distributed, was a great rarity, having seen only three or four specimens during the season.

NOCTURNI.

The Death's Head Hawk-Moth (*Acherontia atropos*).—I have heard of no capture, either of larva or imago, during the past season.

The Small Elephant Hawk-Moth (*Chærocampa porcellus*).—I took a female on the wing, at Newbiggin-by-the-Sea, at dusk in July. Have heard of only two or three larvæ being found on the coast.

Hespialus hectus, lupulinus, sylvinus, velleda, and humuli.—The whole of this family is to be met with in this district. I took several of each, with the exception of *hectus*, of which I only captured one, at Chopwell Woods, in June.

GEOMETRÆ.

Odontopera bidentata.—Larvæ plentiful on ivy, near the town, in September and October.

Ampsshydasis betularia.—A pair, male and female, found at rest, by Mr. Henderson, at Chopwell, in June.

Boarmia perfumaria.—Larvæ on lilacs, near the town, in May. Hybernated.

Gnophos obscurata.—At Newbiggin-by-the-Sea, in July.

Acidalia scutulata, bisetata, incanaria, remutata, aversata, and imataria.—In various localities. June and July.

Macana liturata.—At Chopwell, in June.

Emmelesia unifasciata (a very local species).—I took one at rest, on the trunk of a tree, in Jesmond Dene, in August.

Eupithecia centaureata, succenturiata (very local), *vulgata, sub-umbrata, plumbeolata, nunata, assimilata, tenuiata, and rectangu-lata.*—In June and July. At Hexham, Newbiggin-by-the-Sea, Chopwell, &c.

Chesias spartiata.—Flying over broom, near Hexham, in September.

NOCTUÆ.

Bryophila perla.—Was plentiful at Newbiggin-by-the-Sea, in July and August, at rest on lichen-covered walls.

Gortyna flavago.—On the ballast heaps at South Shields. The larvæ were found feeding on the stems of thistles. I met with several pupæ early in September.

Mamestra albicolon.—Very scarce at Newbiggin-by-the-Sea this season.

Agrotis ravida.—I had the good fortune to capture a specimen of this rare and local species, at Newbiggin-by-the-Sea, in July.

A. valligera and tritici.—I took several beautiful varieties of these *Agrotes* at Newbiggin-by-the-Sea, in July. One or two I think may prove a new species.

Cucullia chamomillæ (very local).—I met with two specimens at rest on palings, in Jesmond Dene, in June.

Phytometra ænea.—This beautiful little moth was plentiful at Chopwell, in June, flying in the sunshine.

PYRALIDES AND CRAMBITES.

Hydrocampa nymphæalis and stagnalis.—The excessive dryness of the season enabled me to penetrate into the heart of the boggy ground situated on Newbiggin Moor, where I met several specimens of those pretty *Pyralides*, the larvæ of which feed on aquatic plants.

Crambus uliginosellus (a very local species).—One of my best captures during the season. It is generally taken singly.

TORTRICES.

Cacochroa grandævana.—Mr. Eales had the good fortune to take six specimens of this *tortrix* first discovered by him, in 1872, in the same locality at South Shields. The larva is supposed to feed on coltsfoot.

Stigmonata dorsana.—I failed to take more than two or three specimens of this rare and very local insect in June. It is in much request, and does not appear in many cabinets.

Penthina picana.—Mr. Henderson took one example of this scarce *tortrix* in Gibside Woods, in July.

Phoxopteryx biarcuana (a local insect).—I took one at Chopwell, in June.

TINEÆ.

Diurnea fagella.—Numerous, at rest, on beech trees in Jesmond Dene, in April. This species varies very much, those met with in the north being much darker in colour than the south-country specimens.

Adela viridella.—This pretty *Tinea* was a very conspicuous object, flying among the foliage of the oak in May and June, the bronze colour of the wings glistening in the bright sunshine.

Gelechia fumatella.—I only succeeded in getting six or eight specimens of this rare species, at Newbiggin-by-the-Sea, in July.

PTEROYHORI (PLUMES).

Pterophorus bipunctidactylus.—Rare, near Hexham, in June.

P. trigonodactylus.—At South Shields, in July. The larva feeds on the stems of the flowers of the coltsfoot.

P. fuscus.—Numerous, at Newbiggin-by-the-Sea, in July.

Alucita polydactylus (*the Twenty Plume Moth*).—Hybernated specimens were numerous, near Hexham, flying among honeysuckle, in May.

X.—*On the Vendace, Coregonus Willoughbii* (*Yarrell*); *C. Marænula* (*Jardine and Jenyns*). By D. Embleton, M.D.

In the autumn of 1871, George Clayton Atkinson, Esq., then President of the Tyneside Field Club, kindly sent me two specimens of this interesting little fish, taken at Lochmaben, Dumfriesshire, early in the month of August. Mr. William Bowe, fisherman, of Lake Road, Keswick, sent me a third, in June, 1872; and in October of the same year, being at Keswick, I obtained of Mr. Bowe other specimens: all these had been taken by him from Derwentwater. He informed me that the Vendace occurred also in Bassenthwaite Lake, and in Ullswater, on the shores of which it was called Skelly.

On looking into our Museum I found five dried specimens marked as under:—

1. *Coregonus Willughbii*, Jardine. *The Vendace*, (Penn.,) Lochmaben, Aug., 1836.

2. *Coregonus Willughbii*, Jardine. *Vendace*, *La Vemme*, Cuvier, Tom. II., p. 307.
   Coregonus Marœnula.
   Lochmaben, Aug., 1839. C. B.

3. *Coregonus Lavaretus?* Flem., Bala Lake, Oct., 1840. Sir W. W. Wynn.
   Coregonus fera? Cuvier.
   Salmo Wartmanni, Bloch. Pl. 105.
   Salmo Lavaretus, Pennant.
   The Gwyniad, Willoughby.

4. *Coregonus Pollan* (Thompson. *The Pollan*, Lough Neagh, July, 1839).

5. Specimen of the same, but without name or reference.

The present paper refers to all the above specimens of *Coregonus*.

The Vendace does not exist in our eastern waters, but as it occurs not far from the western borders of our district, namely, in Cumberland and Westmorland, and as it may be as well to assist in the illustration of the specimens in our Museum, I promised Mr. Atkinson to write a notice of the Vendace.

This delicate and elegant fish is said to be a member of that valuable Family, the *Salmonidæ*, Order, *Malacopterygii Abdominales*, and it has also strong affinities to the next Family, the *Clupeidæ*, consisting of the Pilchard, Herring, Sprat, Whitebait, Anchovy, etc.

Pennant makes it the same as the Gwyniad of Wales, and gives among its synonyms, "Vandesius and Gevandesius (Sib. Sect. 26), the Vangis or Juvangis of Lochmaben."

He quotes the tradition that the fish had been introduced by

Mary, Queen of Scots, and says, that "as in her time the Scotch court was much frenchified, it seems likely that its name was derived from the French *vendoise,* a dace, to which a slight observer might be tempted to compare it from the whiteness of its scales. The British name, Gwiniad, or Whiting, was bestowed on it for the same reason."

The name Vendace is however of uncertain origin: some derive it, as Mr. Atkinson informs me, from La Vendée, whence they suppose the fish to have been brought.

The Vendace was first distinguished as a species by Jardine, and then separated from the Gwiniad, the Skelly, the Pollan, and the Powan by Yarrell* and by Couch,† both of whom described and figured it. The figure by Couch is preferable to that by Yarrell, which is said by Couch, and, judging by the specimens before us, correctly, to be too slender.

Further on, reason will be given for dissenting from the opinions of these two Naturalists that the above-named fishes are specifically distinct.

Nilsson says it inhabits most of the rivers and lakes of the middle and north of Sweden.

Dr. Robert Knox,‡ in his Essay "On the Salmon, Herring, and Vendace," first showed that the food of the Vendace consists of the several species of Entomostraca (Lyncei, Cyclops, etc.) which are abundant in the lochs at and near Lochmaben.

As to its habits, it swims quickly, in large shoals, like the Herring and similar fish, retiring to the depths of the lakes in warm and clear weather. The males are much less numerous than the females, the proportion being as one to twelve in the middle of December (Knox): on other occasions it has been found to be as two to forty, and as six to nine (Zoologist, June, 1855). The males are smaller than the females. It breeds rapidly, spawning about the middle of November (Jardine), in mid-winter (Knox).

Dr. Knox states that "it yields in delicacy as an article of food to no other fish that I am acquainted with."

* Hist. of British Fishes, 1836, Vol. II.

† Hist. of the Fishes of the Brit. Islands, 1856, Vol. IV.

‡ Trans. Roy. Soc., Edinb., Vol. XII.

The proprietor of the Lochmaben waters, and his friends of "The Vendace Club," fully aware of the excellent quality of this fish, used, in the doctor's time, to have a festive gathering by the lochs every July, netting and feasting on their favourite.

It has been said that the Vendace is of so delicate a nature that it cannot be transferred to other waters, that indeed it dies as soon as taken out of the Lochmaben waters.

The acute Knox, however, exploded that fiction or fallacy. At page 506 of his Essay he says, "It were worthy of the societies established for the encouragement and protection of British fisheries, and of wealthy private individuals, to extend the range of the Vendace, by transferring it to the numerous lakes spread over this country, its food (being now known) being first ascertained to be present, or if not in the lake, previously located there for a considerable period."

"As connected with their generation and convenient transfer to other lakes, we may remark, that the ova of the Vendace were found to be very large on the 14th of December, so that they evidently spawn in the depth of winter; and I have ascertained, contrary to the generally recorded opinion, that they not only bear handling, but are pretty retentive of life after being removed from their native element, so that a removal to a distance is by no means impracticable. Thus we should obtain an excellent article of food, and an addition to our markets, instead of all that tribe of fishes of the Dace, Bream, or Carp kind, which hardly any one in this country will use as food. It were easy, even in certain lakes, to procure an exclusive habitat for the Vendace. The speculation were no doubt a profitable one."

It may be added, if the Vendace has, in former years, been brought to its present locality from the Continent, what is to prevent its being removed to short distances with all our present improved means and appliances of pisciculture?

The above suggestion has never been acted upon, nor could it be successfully carried out unless the voracious Pike were absent from the waters to be inhabited by the Vendace.

It is said that there are about thirteen other species of fish besides the Vendace, such as Trout, Dace, Bream, Pike, and so on, in the waters of Lochmaben, and there are the same in the lakes of Cumberland and Westmorland, so that the delicate but swift swimming Vendace has little protection for himself, his spawn, and his young broods, and will gradually tend towards extinction. Indeed, Mr. Bowe wrote from Keswick, in 1872, to the effect, that our fish is rare in Derwentwater, and that those they do find are mostly bitten by Pike. He had only caught one with fly, and a friend of his another with worm, but that about thirty years ago some men caught about sixty with a net near Lodore: now the fishers get one or two in some years, and in others none.

Mr. Atkinson informs me that it was generally believed in Dumfriesshire that the Vendace is found in only two of the many lochs at Lochmaben, viz., the Castle Loch and the Mill Loch, that it had become scarce, only five having been taken in 1865, eighteen in 1866, and sixteen in 1867, that it is fished for with a net, and on one day only in August (Knox says July); also, that its decrease in numbers is attributed, not to the Vendace Club, but to the drainage of the lochs which has been going on for many years, and has reduced their depth several feet, thus diminishing the feeding ground of the fish by many acres.

As therefore the Vendace is becoming more rare, and may in a few more years go the way of the Great Auk, it may be as well to put on record the characters of the specimens we possess.

The internal anatomy was once exhibited by Dr. Knox in a series of preparations kept in his museum, and these may possibly still exist in some Edinburgh collection, but I have not seen them. In the works of Bloch, Yarrell, Jenyns, Couch, and others, we look in vain for any description of the internal parts.

External Characters.—The dried specimens in our Museum have been compared, as far as practicable, with our fresh specimens. The measurements are here given in a tabular form, and were taken with the aid of Mr. John Hancock, whose accuracy in such matters is well known.

NAME OF FISH.	Length in Inches.	Depth in front of Dorsal Fin	No. of Mucous Pores.	No. of Gill Arches.	Branchiostegal Rays.	No. of Rays in Fins and Tail.					
						Pectoral	Dorsal.	Ventral.	Anal.	Adipose or Mucous.	Caudal.
1. Mr. Atkinson's VENDACE	$7\frac{1}{10}$	$1\frac{1}{2}$	68	4	9	15	11	11	12	Present.	20
2. Mr. Atkinson's VENDACE	$8\frac{6}{10}$	$1\frac{7}{10}$	68	4	9	16	12	11	12	Do.	20
3. (No. 1). VENDACE in Museum	$6\frac{5}{8}$	$1\frac{5}{8}$	68	...	...	16	11	12	12	Do.	24
4. (No. 2.) VENDACE in Museum	7	$1\frac{5}{8}$	...	...	...	16	12	12	12	Do.	24
5. GWINIAD, Bala Lake, Wales...	$9\frac{3}{4}$	2	80	...	...	19	12	12	13	Do.	28
6. GWINIAD? Nameless	10	2	84	...	...	18	12	11	12	Do.	28
7. (Ireland). POLLAN, Lough Neagh	$11\frac{1}{2}$	$2\frac{1}{2}$	85	...	...	15	12	11	13	Do.	28

Two specimens of the Herring (*Clupea harengus*) and two of the Burn Trout (*Salmo fario*) were in the next place compared with those of Vendace.

The general outline and aspect, except as to colouring, of the Vendace, are much the same as those of the Herring; the shape of the head and mouth, the mystache, gill cover, and preoperculum are more like the corresponding parts of the Herring than those of the Trout.

The skin of the Vendace and Trout is thick and tough, and can easily be dissected off, whilst in the Herring it is thin and delicate, and not easily detached from the muscles; the skin of the Vendace is silvery, and, like that of the Herring, devoid of spots.

The lateral line of pores exists very plainly in the Vendace and Trout, very obscurely in the Herring; the line of separation between the dorsal and ventral muscles corresponding to the lateral line is very conspicuous in the Vendace and Trout, when the skin is removed, but is not perceptible in the Herring.

The fins are not widely different in the three fishes, except that in the Vendace and Trout, and not in the Herring, there is an adipose or mucous fin between the dorsal and the root of the caudal fin. The fin rays vary in different specimens of Vendace, and are difficult to count.

The inferior edge of the body in the Vendace, from the pectoral to the ventral fins, is like that of the Trout, being somewhat flattened, but beyond the ventrals is sharp or keel-shaped, as the ventral line is all along the body in the Herring.

The teeth of the Vendace are scarcely perceptible in the jaws, and there are two or three rows of rudimentary teeth on each side of the median line of the tongue.

In the Herring, there are very minute and backwardly curved teeth about the symphysis of the lower jaw, and rudimentary teeth on the tongue and on the palate, as in the Vendace. The angle formed at the back of the symphysis of the Herring is bridged over for a small space by membrane, the posterior margin of which is crescentic, and there is a similar, though smaller, arrangement behind the symphysis of the upper jaw. These membranes exist also, though they are of less importance, in the Vendace, but are absent in the Trout. At the upper part of the symphysis of the lower jaw, but external to the mouth, is a small smooth black knob in the Herring, but this is wanting both in the Vendace and in the Trout. The Trout has numerous conspicuous and sharp teeth in both jaws and on the tongue.

Internal Organs.—The alimentary canal of the Vendace is simple and short, and closely resembles that of the Trout, and that also of the Herring; it is a plain tube bent twice upon itself at the upper part, and then, running straight backwards, curves near the end slightly downwards to the anus. Its dimensions in the fresh specimens are, from the commencement of the œsophagus to the bottom of the first turn one inch and one-sixteenth, thence to the top of the second turn seven-eighths of an inch, and from that part to the anus rather more than three inches, about five inches in total length. The bent upper part of the tube is somewhat wider than the rest. The liver is small and of a pale yellow, its duct opens into the duodenum. Pancreatic cœca, spleen, and swim-bladder are absent. The reproductive organs are in a state of complete inactivity, and so minute that the sex was not distinguishable: the specimens were killed in August.

The appended figure, drawn by Mr. John Hancock, represents exactly the alimentary canal.

Alimentary Canal. *Vendace.* Natural size.
Liver in dotted outline.
Nov. 30, 1871.—By John Hancock.
Length of Fish, $7\frac{1}{10}$ inch.
Do. of Canal, $5\frac{1}{16}$ inch.

The external characters of the Vendace, the Gwiniad of Wales, and the Pollan of Ireland, are so much alike that no specific difference can be drawn between them, they differ only in size. It is for this reason that it is considered most probable that they are mere varieties of the same *Coregonus*, whilst the Powan of Perthshire, the Skelly of Ullswater, and the Swedish fish mentioned by Nilsson are probably also only varieties of the same.

The Vendace, in its external characters, with the exception of the adipose fin, which is regarded as belonging specially to the *Salmonidæ*, and, in its habits, approaches nearer to the *Clupeidæ* than to the *Salmonidæ*, to the Herring than to the Burn Trout: in its internal organs it resembles the former as much as the latter of these fishes. It may be a question whether it does not rank more properly with the *Clupeidæ* than with the *Salmonidæ*. If the presence of an adipose fin is to be the decisive point, then the Vendace belongs unquestionably to the latter family. Perhaps it is a connecting link between the two neighbouring families. The lately acquired specimens of the Vendace have been presented to the Museum.

XI.—*Second Instalment of a Catalogue of the more Remarkable Trees of Northumberland and Durham.* By GEORGE CLAYTON ATKINSON.

HOLLY. A group of Hollies, consisting of twelve or fourteen stems, and extending about 40 feet from N. to S., growing closely together, and about 20 feet high, grows on the S. side of the road from Hexham to Slaley, half a mile S. of the Linnels Bridge, where a branch road comes in from Corbridge. It is "weel kenned" in the neighbourhood, as "The Hollin Bush of the Linnels," and is said to be one of the places where, during the rebellions of 1715 and 1745, the rebels and their friends exchanged letters. At that date this bush was very likely a large hollow tree, in which the letters of either party might have been deposited.

I visited the place in 1873, and had no difficulty in finding the clump of scrubby Hollies; but on asking if it was not the place where the rebels exchanged letters in 1715 and 1745, every one seemed chilled with caution, and nothing more could be learned than that "The Hollin Bush of the Linnels" was a place "weel kenned by the drovers" (it is by the side of one of the great lines of road by which the drovers took cattle from Scotland and the north of England southward), "but it aye had a bad name." At present, as I say, it is a scrub of closely growing bushes, rather bowed out in a sort of arbour on the roadside, where the drovers in passing possibly rest themselves, with numerous letters and initials carved on the stems of the trees. I was so struck at the obvious reticence shown by those from whom I asked for information bearing upon the rebellion, that I mentioned it to my late lamented friend Dr. Charlton, who sufficiently explained it, as being a remnant of the extreme caution inculcated in those troubled times, and which had in a manner become traditional as to all matter connected with the rebellion. Dr. Charlton said he remembered an old lady who, even in his day, used to head every note she wrote with the cautionary notice, "read and burn." At Fourstones was a stone where exchanges of letters took place; and sometimes these were effected by private friends who devoted themselves to the cause. He mentioned two Miss Swinburnes, of Capheaton, and a Miss Hodgson, who rode with messages about the country, and went by the name of the "Galloping Graces."—(*Oct.* 1, 1873, *G. C. Atkinson.*)

NUNWICK.

ASH. A fine Ash tree stands on the lawn 120 yards S.W. from the Hall. Girth,* 14 feet 10 inches: bole, 18 feet, then divides into two stems; height, not great.

A handsome tree, but entirely hollow. It was one of a group in the village green, which was subsequently enclosed in the Park.—(*Nov.* 28, 1873, *G. C. Atkinson.*)

HOLEYN HALL.

PICEA NOBILIS, about 80 yards from House, on S. side of walk running to the W. on a line with the House. Girth, 10 inches: height, 16 feet.

Planted 16 years since. Very vigorous and healthy.—(*Jan.* 12, 1874, *G. C. Atkinson.*)

DISSINGTON.

BLACK AMERICAN SPRUCE, on Lawn 95 yards W. of House. Girth, 3 feet 3 inches: height, 43 feet 6 inches.

* The girth, when not otherwise stated, is always taken at five feet from the ground.

A very handsome healthy tree, the branches showing a tendency to droop down and take root.

Hemlock Spruce, 70 yards W. of last. Girth at a height of 3 feet, 6 feet 3 inches: height, 32½ feet.

A straggling tree; foliage and branches on N.W. side broken off.—(*Jan.* 22, 1874, *G. C. Atkinson.*)

LUMLEY CASTLE.

Beeches. There are some fine Beeches three-quarters of a mile S.E. from the Castle, but of trifling girth: the finest and most N.E. is 123 high, but its girth is barely 8 feet. A fine Beech grows about 200 yards W.N.W. from the Castle, and 45 yards from the river Wear, which is 11 feet in girth, and 75½ feet high, with a spread of 22 yards from side to side.

Lime. A row of fine Limes close to S. side of the Ferry House, on the E. side of the river, and 15 or 20 yards from the water side: total spread, 20 yards: height, 67½ feet. There is also a row of good Limes at the N.W. corner of the Park, the most N.E. but one of which is 12 feet 5 inches in girth; spread, 20 yards, and height, 72½ feet.

Oak. A very handsome picturesque Oak grows on the Lawn 120 yards S. of the Castle. Girth, 12 feet 3 inches: bole, 8 feet high: height of tree, 48 feet.—(*April* 6, 1874, *G. C. Atkinson.*)

DEANERY, CHESTER-LE-STREET.

Poplar. 50 yards to N.E. of the House, and rather over the edge of a slight ravine, grows a noble tree in full vigour. The late Mr. P. J. Selby was at a loss, I am told, to give it its specific name, therefore I shall not venture to do so; though, after reading Selby's remarks on Poplars, I take it to be *P. canescens*, or Grey Poplar. Its dimensions are, girth, 14 feet 8 inches: bole, 8 feet high, and then a thickish limb to S.: then 10 feet more bole, with girth slightly increasing, and then it branches out in all directions: height, 62½ feet.—*June* 30, 1874, *G. C. Atkinson.*)

LAMBTON CASTLE.

Beech, on N. at entrance of drive to Lambton Bridge. Girth, 14 feet: height, 72 feet: spread, considerable, but irregular: bole, 7 yards, then divides into six large limbs.

Oak, 100 yards S. of last. Girth at 2 feet, 15 feet 2 inches (girth of a limb branching out to N., 11 feet 4 inches): bole, 6 feet, then divides into four limbs, of which the above-mentioned is the largest: spread, 30 yards, height, 51½ feet.

Oak, between the Brewery and Forester's House, 100 yards E. of latter. Girth, 10 feet 7 inches: height, 45 feet 6 inches: spread, 21 yards. A healthy picturesque tree.

Sycamore (the best in Lambton), on river bank, about 200 yards above Lambton Bridge, and 20 yards from river Wear. Girth, 11 feet 6 inches: height, 68¼ feet: spread, 19 yards: bole, 12 feet, and then divides. A handsome healthy tree.

Wellingtoni. Height, 35 feet 10 inches: girth, 4 feet 3 inches.—(*April* 6, 1874, *G. C. Atkinson.*)

BIDDICK.

E. side of Avenue to House contains some fine Willows. The one fourth from the House is 12 feet 5 inches in girth: bole, 9 feet high: spread, 27½ yards, then divides into two large stems: height, 81½ feet. The first Willow from the House has a girth of 12 feet 2 inches: a spread of 21 yards, and a height of 69 feet.

Ash. A good tree grows about 150 yards N.E. of the Hall, near the road. Girth, 13 feet 4 inches; bole, 10 feet, then divides into six or seven limbs: spread, considerable: height, not great: head, rather meagre.

Peach. A Peach tree, in a house which it completely fills, covers a space 35 feet long by 14 feet 6 inches high. It usually bears thirty to forty dozen of very fine peaches, which ripen in June. Girth, as it leaves the ground, about 2 feet 6 inches. It is about twenty years old.—(*April* 6, 1874, *G. C. Atkinson.*)

HOUGHTON-LE-SPRING RECTORY.

THORN. "Bernard Gilpin's." In the Rectory Garden, 20 yards N. of the W. end of the House, grows an old Thorn tree, which has been carefully tended for several generations; the iron straps and bands which support it having in many places become completely grown over by the wood. Its girth, on leaving the ground, is 11 feet 9 inches: it at once divides into four large limbs, which spread away from each other, and are clamped and bound together with iron straps and chains. The spread is 15 yards: height, 27 feet. At the surface of the ground the four branches have parted entirely from each other, leaving an oval space on the ground of 22 inches by 12 inches. The N. branch, at 1 foot from the ground, is 5 feet 4 inches in girth; the next, 3 feet 10 inches; the S.E., 4 feet 10 inches; and the N.E., 3 feet 6 inches. It is a princely Thorn, and decaying fast.—(*April* 6, 1874, *G. C. Atkinson.*)

ELEMORE.

There is a good deal of wood about Elemore Hall, mostly Beech, and some of it large. One of the finest trees, 150 yards N.E. from the House, is 11 feet 6 inches in girth, and 68½ feet in height.—(*April* 6, 1874, *G. C. Atkinson.*)

GIBSIDE.

OAK. "The King." A very grand tree; grows in the ravine, 100 yards E. from the House. Girth, 15 feet 1 inch: height, 103 feet: bole, 55 feet of clean stem, and then a few moderate branches. It is a noble tree, containing a great deal of capital timber. Several other fine Oaks grow near it.

The tree stands on sloping ground, and the mean surface level is midway between the highest and lowest. This noble tree is computed to contain 500 cubic feet of timber; the bole is very magnificent, tapering very little for 55 feet: the spread is trifling.

From a framed description in the steward's office, dated Dec., 1800, the girth, at 7 feet from ground, was 13 feet 4 inches; in 1808, the girth at 7 feet was 13 feet 8 inches; now, in June, 1874, the girth at 7 feet is 14 feet 9 inches.

SCOTCH FIR. A fine tree, about 100 yards W. from House and 20 E. of River, is 8 feet 10 inches in girth and 93 feet high. Fine and healthy.

CEDAR. Two fine ones grow close to S.E. corner of the House. —(*June* 1, 1874, *G. C. Atkinson.*)

BIRTLEY WHITE HOUSE (NEAR CHESTER-LE-STREET).

COMMON THORN. A fine Thorn tree grows about 20 yards S.E. of the House on the same level. Its girth, at 1 foot from the ground, is 6 feet 7 inches, though that is partially due to the spread of the branches, which commences soon after leaving the ground; these are five in number, projecting evenly and symmetrically, and forming a very handsome healthy tree.—(*June* 2, 1874, *G. C. Atkinson.*)

PLESSEY (NEAR MORPETH).

LIME. In a field N.E. of the old Hall, in a line of 30 yards long, running N. and S., the S. end being close to the House, is a row of fine Limes. The second from the House is 8 feet 5 inches in girth. They are all healthy trees. There are also four very fine Lime trees about 150 yards to S.S.W. of the House; the nearest, about 150 yards from it, is 10 feet 6 inches in girth: bole, 8 feet, and then spreading, round-topped head: height, 53 feet: spread, 11 yards; another, 60 yards S. of last, is 12 feet 8 inches in girth, but rather flattened in the stem, and distorted: bole, 8 feet, and then a tangle of small closely-growing branches: height, not great.—(*June* 19, 1874, *G. C. Atkinson.*)

GLANTON PIKE.

Araucaria, 20 yards S.W. of House. Girth, 3 feet 1½ inches: height, 29½ feet. Fine healthy tree.

Pinus Kutrow, on S.E. of House, planted in 1829. Girth, about 9 inches: height, 31 feet.—(*June* 26, 1874, *G. C. Atkinson.*)

WALLINGTON.

Willow, on the New Houses Farm, between the road and the river Wansbeck, to E. of Wallington. Girth, 11 feet 6 inches: height, 81½ feet: spread, considerable. A fine healthy tree.—(*June* 29, 1874, *G. C. Atkinson.*)

American Birch (*Betula papyracea*). Growing on the E. side of a little burn running to the S. from the Statue Pond to the Garden Pond, and 50 or 60 yards apart, are two trees. Girth of the N. tree at 4 feet, 6 feet 4 inches; at 5 feet, it branches into two straggling limbs, which afterwards divide again into branches meagrely clad with leaves, somewhat larger in size than those of the common English Birch. The S. tree is about the same height, 40 feet; and they are both ugly, ungraceful trees.—(*June* 30, 1874, *G. C. Atkinson.*)

LOW GOSFORTH.

Sweet-scented Oleander, on Lawn, 50 yards S.W. of House. A standard tree, just dying. Girth at 4 inches, 12 inches: vertical stem, 13 or 14 feet high, with three or four branches, and one or two fragrant flowers in bloom.—(*July* 9, 1874, *G. C. Atkinson.*)

HALLINGTON.

Hornbeam, growing on a steep bank. Girth, 7 feet 5 inches: height, about 70 feet: spread, 30 feet. A fine healthy tree.—(*July* 27, 1874, *Sir W. C. Trevelyan, Bart.*)

SEDGEFIELD RECTORY.

In the Garden is a group of five Evergreen Oaks, 50 yards in front of the House. The finest, and most N.W., is 9 feet

4 inches in girth at 4 feet from the ground, and 47½ feet high: spread, considerable. All five trees healthy, and in good condition.—(*Aug.* 27, 1874, *G. C. Atkinson.*)

HARDWICK HALL

Has some good trees in the beautiful Park, but none worth recording among remarkable trees.—(*Aug.* 27, 1874, *G. C. Atkinson.*)

FOWBERRY.

Small-leafed Lime. A very handsome tree of this kind grows in the Garden, about 60 yards W. of the House. It has evidently been grafted on the common Lime, as its branchlets push through the bark all the way up to the top of the bole, some 12 feet high. The tree itself is a fine one. Girth, 13 feet: spread, 20 yards: height, 58½ feet.

Silver Fir. A fine Silver Fir grows about 100 yards W. of the House, in the edge of the Garden. Girth, 11 feet: height, 86 feet.

There are other good trees about the Grounds; but none conspicuously so.—(*Oct.* 30, 1874, *G. C. Atkinson.*)

WALWORTH CASTLE (DARLINGTON).

Horse Chestnut. Two magnificent trees of this kind grow about 60 yards from the Castle, on its E. side, about 60 yards apart, N. and S.; the N. a female and the S. a male tree. Both trees, especially the S. one, shew a great tendency to bow their branches to the ground, and then strike root and rise again. The boles of both are about 9 feet, with a height of about 63 feet: the girth, however, of the S. tree is 15½ feet, and its spread 105 feet, while that of the N. is only 13 feet 9 inches. They are noble trees, in full vigour, and well become their position near the quaint old Elizabethan Castle.—(*Oct.* 22, 1874, *G. C. Atkinson.*)

LILBURN TOWER (NORTHUMBERLAND).

P. Wellingtoni. In the year 1856 twenty-four seeds of this tree were brought from California, and given by the late Rev. Wm. Dodds, of Chillingham, to John Collingwood, Esq., of Lilburn Tower. They all grew; and at this time Mr. Collingwood and I counted fourteen fine young trees, which are thriving and vigorous, in the Grounds at Lilburn. I give the situation and dimensions of some of the most conspicuous:—

(1) On the Terrace, about 20 yards N.W. of House. Girth at 5 feet, 4 feet 4 inches: height, 32½ feet: spread, 4 yards.

(2) Half-way along the W. Carriage Approach, and on S. side. Height, 36½ feet.

(3) At a distance of 200 yards from House, and 60 yards N. of the W. Carriage Approach. Girth at 5 feet, 3 feet 9 inches: height, 32 feet 9 inches: spread, fair.

All these trees (as is their habit) are very massive at the base of the stem, and thence taper rapidly upward.—(*Oct.* 30, 1874, *G. C. Atkinson.*

Corrigenda.—The heights of several lofty trees, viz.:—The Silver Firs, in Alnwick Park, in Eslington Park, and in Hartburn Dene must be re-measured, as the tops of these trees had all a strong set to one side, which made them appear shorter than they really are.

ADDRESS TO THE MEMBERS OF THE TYNESIDE NATURALISTS' FIELD CLUB,

READ BY THE PRESIDENT, RALPH CARR-ELLISON, ESQ., AT THE TWENTY-NINTH ANNIVERSARY MEETING, HELD IN THE MUSEUM OF THE NATURAL HISTORY SOCIETY, NEWCASTLE-UPON-TYNE, ON WEDNESDAY, MAY 5TH, 1875.

Gentlemen,—It was with much hesitation and misgiving that I accepted the duties of President of our Tyneside Naturalists for a second time; having formerly enjoyed the honour of occupying their chair immediately on the formation of the Society some twenty-nine years ago. Yet if the impediments could have been foreseen that have prevented me from attending any of the Field Meetings of the year, excepting one, I could never have yielded at all to the desire of those kind friends who nominated me at the last annual assemblage. For the presence of the President at the excursions ought certainly to be obtained, whenever it is possible, for reasons manifest to us all, and to none more so than to me.

Before proceeding further, however, I will now read the notes of our able and zealous Honorary Secretary, Mr. T. Thompson, in order that the occupations of the day on each of the several appointments for the field, may, through his conscientious fidelity to our intentions, be clearly brought under view.

If I could have been present at the first excursion, and the weather had permitted a party to assemble, it was a favourable occasion, of which I wished to avail myself, for pointing attention to the abundance of the common butter-cup and other *ranunculi* in the pasture and old meadow-lands of our country. Whilst the golden sheen of their inflorescence is a topic of popular and general admiration in the month of May in every southern and midland county, and also in Yorkshire, I have at times been amazed to hear some northern farmers speak of them as weeds, occupying the space that ought to be filled by grasses or clovers. On asking why this idea had been adopted, it was "Because you may always see that the beasts eat between the butter-cups and leave them." It was forgotten that animals also avoid a large part of the seed-heads of all the grasses themselves: of the clovers also. Thus it is that by a beneficial distaste they forbear to consume too much of the reproductive organisation which perpetuates their pasturage.

And as regards the leafage of the *ranunculi*, it is extremely copious, and is freely consumed by kine and sheep, intermingled with the succulent grasses, plantains, sorrels, and clovers, to all of which its warm and pungent quality serves as an invaluable corrective no less than as a relish.

Whenever I see an old grass field golden with butter-cups, these proclaim to me its wealth in grasses and clovers; whilst the marvellous variety and compensatory arrangements in our natural pasturages, and in each square yard of them, may be studied with ceaseless instruction, teaching us how really to improve within man's legitimate knowledge and power.

In reference to the July gathering, my health not being nearly so good as I am thankful to say it now is, I took the precaution of going up to Haltwhistle the night before, in order to be forthcoming in the morning. I had the satisfaction of meeting several members of our body at breakfast. An engagement, however, to show to a gentleman from Germany, who was to join me, the Roman station of Amboglauna, together with Lanercost and Naworth, compelled me to give up the attempt to accompany the party, (who were to proceed to Castle Hill and Blackburn and Tyndale Tarn), until we could all meet again in the evening at the Naworth Station.

First enabling my companion to make a second breakfast at Gilsland, sunshine and an open carriage with good horses were before us. I saw indeed one of the most charming districts in the North of England, but one which was already familiar, yet not only missed the new country traversed by the pedestrian party, but also missed the afternoon repast in their company. Meanwhile my Teutonic friend had to content himself with eggs and bacon at Naworth, which was all we could procure, save some honest ale to wash it down. My companion was delighted with the fine characteristic architecture of Lanercost, but to the last never could pronounce that Cymro-Celtic name; he was also greatly pleased with Naworth, but before we regained Newcastle professed himself nearly famished. So much for the air of the Irthing, rather than for any lack of viands of the homely old Border kitchen.

At the St. Abb's Head Meeting my son Edmund represented me. The ground traversed by our members was, however, so well known to me that I could follow them every step of their way. That extensive and bold line of projection of the Berwickshire coast-uplands into the open sea, affords magnificent distant prospects to those who wander along the commanding heights over the cliffs, now rising now falling, but ever covered by the finest verdure and most elastic turf. Look south, you have Holy Island, Bamborough, and all the Northumbrian coast; south-west, and Cheviot rises in great majesty, with all Tweedside at his foot. Turn round to the north, and the Isle of May, the Bass, the grand opening of the Firth of Forth, and the coast of Fife beyond, all seem close under the eye. It is hard to say whether the English or the Scottish landscape be the fairest. Nay, it is possible so to stand as almost to embrace them both; or, at least, the image of the one remains upon the senses whilst we are diverting our eyes towards the other. My son was greatly pleased with the excursion, and described it as having been gratifying to all present.

It gave me no small concern that he was not within call to go to the gathering at Hartlepool and Seaton Carew, in September, which I was unable to attend myself, though it would have interested me greatly. Above all would I fain have been there whilst one so admirably befitted as Dr. Embleton to accept the responsibility of composing a memoir of our distinguished fellow member, the late Mr. Albany Hancock, was to fulfil his promise of reading it to those present.

As respects the meeting at Chester-le-Street and Lumley, I was much relieved to hear that it had been well attended, notwithstanding the lateness of the season, and that under better guidance than I could have offered, it had been very pleasantly carried out.

If I could have been present at the day's excursion in this locality, I would perhaps have adverted to the lamentable condition of the valleys of the Wear and of the Tyne, not only from the direct effects of the volumes of opaque smoke, which are needlessly emitted from so many chimneys, in poisoning vegetation with the sulphurous acid which that opaque smoke contains, and in choking the pores of leaves and bark with acrid soot; but also the languishing condition of those naturally noble valleys from a concomitant indirect injury, chargeable to the same wanton interference with atmospheric purity. The broad and elongated dales of these two fine rivers are deprived of probably nearly half of their natural dew-fall by the clouds of smoke that overhang them, and intercept terrestrial radiation by their foul curtains, so that the moisture of the air is not condensed.

Meanwhile this is no necessary evil, inseparable from successful collieries and ironworks, for every man, I will not say of science, but of common information, knows that wheresoever there is the will there also is ready the way to reduce the mischief to comparative insignificance; and this with no loss, but ultimate advantage, to the owners of the works concerned.

The dew never descends upon these vales in anything like its natural abundance; whilst that which does descend comes soured by sulphurous acid.

It is well thus to record what we are suffering, for, like other abuses, this too will come to be repressed, when once it shall be firmly and steadily resisted.

It now only remains for a confessedly defaulting President, who, like the old hound in the fable, has rather to blame the decay of his powers than of his good will, to make any amends that he may, by not neglecting his address on quitting the occupancy of the chair. And to a Society comprising many able men, far more versed than I am in subjects that interest us all, I feel that the most useful contribution I can offer will be to record in this paper any practical information, in the way of facts or phenomena, observed by myself, which such men may themselves deal with; at the same time not suppressing my own deductions therefrom.

A long life, passed mainly in the country, and in so fine a district as the vale of Wooler, ought not to be quite barren of observations on the course of natural appearances. Nor were country gentlemen inattentive to such matters, in our neighbourhood.

About 1835 an admirable work on forest-trees and naval timber was published by Mr. Matthew, a Scottish landowner in the Carse of Gowrie. Notwithstanding the special and restricted title of the treatise, its author, a man of research and of strong, masculine intellect, introduced discussions, embracing not only the well-defined species of British forest trees, but varieties or races subordinate to such species; at the same time availing himself of elucidations from like diversities in other vegetable productions. The "Philosophie zoologique" of Lamarck was then a work of still recent date. The principles therein set forth respecting the origination of the forms of animal life were not only perfectly known to Mr. Matthew, but referred (when adduced) to their French expositor by name; so that every reader of the Scottish author on forestry was fully aware, long before 1840, of the nature of discussions, involving the essence of those which came to the front so prominently twenty years later, in 1859, in a well-known production of Darwin.

The consequence was that those who had long been familiar with the topics, arguments, and train of thought brought under consideration in Scotland by Mr. Matthew, could afford to be somewhat calm under the excitement from more recent speculations not so new as was commonly believed. But the reason for at present reverting to the epoch of 1835–40, is merely to show that men living even quietly in the country had reason, in those days (at the time when Selby was engaged on his own original treatise on arboriculture, which will ever be so precious to Northumberland), to be vigilant and observant as to every fact and every unwonted circumstance bearing upon the apparent stability or instability of species, or even of well-marked varieties, whether in animal or vegetable existence.

In connection with this train of thought, it happened that several seedling specimens of young coniferous trees were to be selected at a great nursery garden in Edinburgh. It was about thirty years ago. Among other trees I chose two Deodara cedars from a very ample bed of transplanted seedlings. Both diverged considerably from the prevailing or normal type, but diverged in opposite ways. The one was of a lighter and more delicate, vivid green, than its neighbours, reminding one of the tint of its deciduous congener, the larch; the other was of a rich, dark glaucous green, such as reminded me of the luxuriant tints often assumed by the Cedar of Lebanon in the warm and moist tracts of Devonshire. Both were growing rapidly, and they were of like size, when transferred carefully to a site at Hedgeley, which had proved itself very well adapted to favour the development of coniferous trees. Since that time these two Deodaras have kept pace with each other very equally, standing as they do side by side among other coniferæ. But though the dark green variety, with glaucous underside to its leaflets, is often seen maintaining these features permanently in the warm southern and western counties, my tree has gradually and almost completely lost them; appearing now in the normal garb of the species. The other tree, of the pale, fresh green hue, has sustained its original distinction with little or no modification. The soil where they stand is a deep sandy loam, the slope northerly, with moderate shelter from the west, north, and east; elevation, 400 feet above the sea; air pure, with ample humidity, yet elastic; dews very copious. From this experiment it seems reasonable to infer that the dark-green glaucescent trees of Deodara cedar require a warmer mean temperature to maintain them than do the apparently more tender, but really hardier, light green, which an arboriculturist may easily select from the same seed-beds. In like manner a richly glaucous specimen of the common *Juniperus rubra*, or Red American Juniper, (improperly called cedar,) transferred from the warmer West of Scotland to the sharp air of the Cheviots, at Hedgeley, completely divested itself of its peculiar tints within two years, and assumed a simple lively green; at the same time showing signs of tenderness very unusual in the normal individuals of this hardy species.

The geographical distribution of well-marked variations may contain the key to very important truths, since a change of locality might be made in order to test the reality of a supposed specific distinction. The following occurrence has interested me, in this point of view, humble and homely as it is.

There is a well-known kind of lesser whin, gorse, or furze, either found intermingled with the common *Ulex Europæa* in the milder western and southern parts of England, or even, in some districts, seeming to supplant it. It flowers in September, instead of in April and May, like the larger whin. Its distinctive characteristics of twigs, and flowers, and subordinate stature, are all sufficiently uniform, constant, and self-evident, to mark it clearly.

I suppose it to be the plant commonly indicated under the designation of *Ulex nana.*

In North Wales it often forms coverts by itself alone. In Pembrokeshire it commingles with the common or greater *Ulex Europæa.* In Ireland again it generally commingles.

It occurs in the neighbourhood of Warwick, and is frequent in Cumberland, though rather kept down by diminished temperature.

Some twelve years ago, finding pretty, compact young plants of this whin, adorned with flowers, in the neighbourhood of Windermere, in October, I conveyed some of them to Northumberland, which I planted at Hedgeley, where no such whin is found, though *Ulex Europæa* abounds. The plants grew, but only tardily, and showing but very little flower, though open to the sun on a fine dry knoll, where the larger native whin was luxuriating in detached bushes. Three good strong tufts of this whin from Windermere, each big enough to hide a hare, were established, when, to my utter surprise, I observed two of these, after a languid growth for six or seven years in their original aspect, rapidly transmuting themselves, twig after twig, but still always *per saltum*, into our common northern whin, *Ulex Europæa.* The third plant has been nearly if not quite destroyed by frost two or three years ago. I should state that the three tufts, after being kept clear of grass for two or three years, and protected from hares and rabbits, had subsequently been left to take care of themselves, and to contend with the grasses, only that I occasionally tended them myself, and tore away any growth that threatened to overpower them.

The fact that these two plants have really transmuted themselves in twelve years from the *Ulex nana* of Bowness on Windermere into the *Ulex Europæa* of Northumberland, through the influence of a colder and harsher climate, conveys a very interesting lesson to my mind. It teaches me that *Ulex nana* (the lesser, autumn-flowering whin) is only a subsidiary geographical form of *Ulex Europæa.* It is distinct enough and tangible enough to assume the likeness of a distinct species in its own native region, but individual plants of it possess a faculty of assimilating themselves to *Ulex Europœa* when carried to a colder tract, and there kept for a sufficient time.

Since the foregoing was written I have had an opportunity of examining the whin coverts of the New Forest, and of Bournemouth, in Hampshire. The two forms of the plant are largely intermixed, yet without any intermediate form; and I found the *Ulex nana* in the month of May covered with half-ripe pods, full of seed from last October's flowers, the pods being very seldom injured by the late most severe winter, though many of them blackened at the tips. These pods will be ripe in June, nine months after inflorescence.

Ere leaving the subject of the *Ulex*, or whin, it seems worth while to record that a fox-cover which had been formed between Old Bewick and Chillingham by sowing seed of the common *Ulex Europœa*, and which apparently consisted entirely of the larger whin, was utterly killed down by frost some ten winters ago, when it was high enough to be in full perfection as a covert, and although the native self-sown whins of the district had suffered little or not at all. The reason undoubtedly was, that the whin seed of commerce is gathered either in the South of England or beyond the sea, in Brittany, and that though identical in species with our own, the parent plants are often of tenderer subvarieties, which cannot immediately accommodate either their own constitutions or those of their seminal offspring to a region of much colder temperature.

It is not alone extreme low temperature in winter which is fatal to vegetation. For if this be inflicted only after warm and sunny summers, it is half-disarmed by the vigour and vital energy of the plants themselves. A long protracted low temperature, without any great extreme of cold, will be equally destructive in the long run, coming, as it probably does, after a chilly ungenial summer, with little direct sunshine.

The provision of an autumnal blooming, as well as a vernal, greatly tends to insure the security of continuous propagation in Western Britain; and this more dwarf variety fills up the bottoms of the whin coverts, which would otherwise become open and pervious to cold winds.

The great economic value of *Ulex* in countries of Celtic population and small farming, like Wales and Ireland, is sufficiently clear to all who know the habits of the people, the methods used to bruise the green fodder for horses and cattle, the cheapness and efficiency and extensive use of whin fences, the importance of the domestic fuel so abundantly and readily supplied. The very name of the plant, *whin*, familiar to us all in the north, is purely British or Welsh; nor does it anywhere flower more splendidly in May than in these northern counties.

About the year 1847, some seed, from Nepaul or from Cashmere, of the Himalayan Spruce Fir, known best by the title of *Abies Morinda* or *Abies Smithiana*, was sown in our garden. Plants were already, indeed, common enough in the principal nursery establishments; but as they were not always seedlings, but raised from cuttings, this seed was valuable, as fresh and genuine seed from natural *habitats* always is.

Abies Morinda is a very beautiful tree, which is conspicuously distinguished from the European *Abies excelsa* by the spinelet leaves being more elongated towards, and at, the extremity of each shoot, than along the sides of the same. A shoot of *Abies excelsa* compared with one of the European *excelsa* has also its spinelets or needlets, generally, perhaps twice the length of those of *Europœa*, besides the increased elongation towards the extremity. The differential form of tail in the British and European wild cat as compared with that in the domestic cat is curiously parallel. That of the wild cat becomes thicker and has longer hairs near the end, whilst the domestic animal, and the Egyptian original from which it is believed to be descended, has a tapering tail, as our *Abies excelsa* has tapering shoots.

The *Morinda* spruce has shown itself ill-qualified to bear the low mean temperature of Britain to the northward of the Trent, except in a few favoured localities, mostly near the western coast. It is either disfigured by the effects of frost, or its growth is soon brought nearly to a stand. But seven or eight of our best plants, which were very beautiful and well-marked, were in course of time transferred from the garden into a plantation at Hedgeley, admirably suited (by deep and strong soil, on a sharp declivity) to our common spruce, which grew vigorously there. This was more than twenty years ago, but the *Morindas*, though they shot forth in great beauty of Himalayan aspect during several favourable summers, were always dwarfed or paralysed again by cold, and sometimes remained at a stand almost, for two or three seasons. However, as they were situated among a natural coppice of hazel and mountain ash, we allowed them to remain, half-concealed by this protecting shelter, which was never allowed to overhang them. Gradually they have shown more hardihood, but their distinctive Himalayan characteristics are much impaired, so that one might now pass them many times without noticing that they were not the common European spruce, so curiously do they simulate the latter.

I was greatly pleased to observe, the other day, that they have undergone no injury or check from our late severe and prolonged winter. And it will be very interesting to observe whether their future growth may not approximate more completely towards the European spruce. Lastly, I am inclined to think they may show the Himalayan foliation near the ground, where the twigs are sheltered, whilst above they may continue to simulate the European spruce.

Already, however, I have seen quite enough to satisfy me that *Abies excelsa* and *Abies Morinda* are but geographical forms of *Abies* that occupy far distant countries from each other; that the Asiatic tree, transplanted to Northumberland and the neighbourhood of the Cheviots, can only advance in growth very slowly, and not even this till after waiting some years, and then putting forth again in curious approximation to the aspect of its European congener. The finest *Morinda* which I have seen in the north is in the Botanical Garden at Edinburgh. It stands on a very favourable site, where it has preserved its distinctive characteristics in a great degree, and does not seem to have been ever very rudely checked by low temperature.

Let me now pass from these arboricultural notices, which may well have been wearisome to my too-indulgent friends, to some that are zoological, and deduced from special experience in the breeding of sheep, undertaken with distinct and pre-determined objects.

There seems to exist a tendency in the course of nature to provide that the colour of an animal, say, among quadrupeds, of a sheep, or, among birds, of a grouse, should incline to correspond in some degree with the hues of the soil or surface on which its life is to be passed. In the grouse we do certainly find that the darkest and most uniformly heather-clad moors produce the darkest mahogany-feathered moorfowl. Take, for instance, the dark unbroken heather between the headwaters of Weardale and Teesdale for the darkest grouse, and take again some of the bent-and-heather ranges between the Reed and Coquet, or between the Coquet and Breamish, for birds of more chequered feather.

In sheep, we find that the horned blackface, with legs equally black, is historically known to have been long-established on the high heather-clad moors at the heads of Lune and Tees, of Wear, Allen, and South Tyne. From thence it is said to have spread northward into Dumfries and Lanarkshire, and thence again into the Highlands; always displacing certain ancient, but feebler, dun or dun-faced breeds, which formerly occupied the Scottish hills and mountains, and which were strictly under close domestication, being housed at night from the danger of wolves; and thence they came to need protection from cold also in winter. A remnant of this old Scottish dun-faced race still occupies some of the mountain ranges in the Isle of Arran.

Southdown sheep, being subjected to the reflection of a powerful sun, from the arid downs of our southern English counties, assume a brown complexion and tawny legs, much the same as the human inhabitants of the same country become very tawny, whose occupations of shepherds or ploughmen keep them all day in the open air. And formerly considerable extents of heath, juniper, and furze were depastured by these little hard-mouthed sheep, which extended also over the wide heather ranges in Surrey, to utilise which they were well adapted. In the southdown breed we thus again see that the colouring or complexion of the animal is in conformity with its mode of life, and in harmony with the hills it occupies.

I fear we cannot say so much for the present uniformly white flocks of Cheviot sheep which range over our Northumbrian moors, where the pasturage comprises extensive tracts of heather, as well as grasses, rushes, bent, and bracken. It is absolutely impossible, according to the ways of nature, that a perfectly white race of sheep should continue unvaried upon such ground, without assiduous, but misapplied, care on the part of the master and his shepherds to get rid of every change, great or small, which the effects of heather pasturage tend to introduce. The truth is, our Cheviot flocks, in their present state, are highly artificial. They are the result of an elaborate selection by farmers and shepherds, continued for nearly a century, and stimulated by our agricultural shows. They are fancy-Cheviots, and not the legitimate result of nature's laws upon our hills of wild and and varied herbage.

In one respect true wisdom has been shown by our sheep-farmers and our agricultural societies, in their encouragement of animals having black muzzles and black hoofs, as indispensable requisites for successful competition. These features are known by experience to be indications of hardihood. In other words, they are the black *points* which redeem an otherwise white animal from pure and perfect albinism. They are indeed invaluable as far as they go; but how much better if a little more of hearty natural colouring had been left in the flock; if the fancy of imitating the white border Leicesters of the low-lying farms had not beset the hill farmers! If a flock of the best existing Cheviots, as they now are, were in the hands of a man who was a good naturalist, as well as a good farmer, he would be very watchful no doubt to maintain the best points of form, the best quality of wool, the kindliest feeding properties; but, so long as these were kept up, he would encourage every sympton of reversion to the old dun-faced race of heather-Cheviots, despising the silly notion that a dun complexion indicates some taint from a west-country black-face cross.

It indicates nothing but that nature requires colouring on the face and legs of an animal which is to live upon the hills chequered with dark-hued heather. And we may safely confide that a flock, with half its numbers dun-faced and dun-legged, or a little freckled in face and legs, will be hardier in all seasons than one comprising none but white and pale-faced sheep. The dun-faced will assuredly take more freely to the heather, not letting it run to waste as it now so largely does.

Instead of uniformity of hue in a mountain flock, which must feed and live on great variety of ground, let us do as our forefathers did—preserve and admire a good sheep all the more for a robust and tawny tint or freckling on its face. If we prefer only white rams to breed from, let us be the more careful to preserve all good dun-faced ewes. But the man who first restores the best robust dun-faced Cheviot rams will be a benefactor on the Border moorlands. He will himself possess a hardier and a more numerous flock than he ever did before, because he will utilize his heather and his benty pasturage more effectually. There is no need to introduce strange blood to obtain a little colour into the existing flocks. It is ever ready to come, if we only abstain from weeding it out when it appears. Nature in her wrath and revulsion tries to contend with the violation of her laws by producing an opposite extreme, namely, a greater sprinkling of absolutely black lambs than would be yeaned from dun-faced mothers, for such nigels are rare both amongst horned heather-sheep and southdowns. The mouflon and other species, or geographical races, of wild sheep, approximate in colour more to our southdown, and other dusky varieties with light coloured fleeces, than either to white sheep or to black.

A curious circumstance occurred of an exceptional production of young white pigeons in our dovecot at Hedgeley during several successive years, though the parent birds were the ordinary blue semi-feral farmyard doves, with a few among them possessing perfect blue-rock plumage.

On investigation I found that unwelcome increase of white birds in the flock (unwelcome because always tender) arose from my gardener (who was in charge of the dovecot) killing for the table all the young produced in the spring months, which were mostly of the hardy natural blue, and sparing to recruit the flock the autumnal nestlings, which nature, aware of their tenderness, was prone to clothe in white, so as to enable them if possible to survive the winter, by a plumage that should lose a minimum of animal caloric through radiation. I immediately ordered all nestlings of the month of May to be allowed to escape, and all autumn nestlings to be killed for the table. The result was a rapid return to the normal blue, in the aspect of our flock.

Let us now see whether there is anything in connection with game-birds, besides the variable colouring of grouse, according to the more or less dark and heathery surfaces of the moors they inhabit, from which matter of instruction can be drawn.

It so happens that I have had long acquaintance with the common pheasant of the quasi-collared or ringed variety (so frequent in North Northumberland) in its true feral state. Our pheasants at Hedgeley have at no period been reared under artificial management. They have always been allowed to deposit and sit their own eggs in their own way, and to bring up their young as truly unaided as partridge or grouse. Hence they are truly wild pheasants: nor are any of the species bred artificially by my neighbours nearer than perhaps a few at Shawdon, three miles distant. Yet my birds have been repeatedly throwing out, *per saltum*, the pallescent, or blonde variation, which has been absurdly called a Bohemian pheasant. And I believe, if sportsmen could only have been persuaded to abstain from shooting out the cocks, this variation would have gained more and more on the normal aspect of the British pheasant in our locality and district.

We never see pied or pure white birds, neither imperfectly straw-tinted ones. But there comes forth a cock pheasant, so like in hue to the wheaten stubble on which he walks, that nothing but his head and neck, of the ordinary rich purple, can be discerned from a little distance. When again he roosts in the naked larch in winter he is less conspicuous by far than his fellows of the coverts; and we may be sure that there will be less loss of animal warmth from his light buff plumage, than from the dark copper hues that clothe the other males. The hens of the pallescent variation are numerous. They are fine active birds, pale enough to be known at a glance as they run or rise, yet not so light-coloured as to be easily seen when upon the nest. The diversity from the common plumage seems to come *per saltum,* or by a spring, and I think mostly from the egg, for the pallescent cocks when first seen, and too often shot, are mainly yearling or two-year individuals, as their spurs sufficiently show. But we have had one or two fine old long-spurs recklessly slain.

I think it highly probable that these blonde pheasants may be the offspring of parents that have felt the cold of our protracted winters, or the chill of cloudy summers: that, being somewhat deficient in animal caloric, the latter produced an offspring which developed a less brilliant plumage, not exhibiting all the wonted deep and rich colouring, for that nature made a great effort to protect such progeny by giving them a colouring that should better economise the animal warmth in cold winters or cloudy summers.

But if such should be the origin of this most interesting modification, it does not follow that such pheasants may not become by propagation *inter se* a true local variety, as healthy and vigorous as the original type, as rich too in animal caloric, but not so liable to lose it in cold or sunless weather. Their plumage seems to me the analogue in the pheasant of the paler colouring of grouse bred upon moors where the heather is largely interspersed with bent; and the modification is permanent, not seasonal, being useful or beneficial to the bird in summer as well as winter.

Once more let it be understood, that no pheasants in Europe could be more truly wild than these. Contributions of barley or beans in winter, when beech-mast or acorns were exhausted in the woodlands, were indeed laid down for them. Pheasants would wander away and be killed were they not so helped. But in no other way were they artificially treated. And in point of fact, covies of partridge could not exist in time of snow were it not that they resort to places where sheep are fed with hay, for the hay-seeds, seeds of plantain, and even hay-leaves, which enable them to struggle with privation. They cannot be fed with corn, since all the rooks of the country would come. But still they are thus far artificially sustained, although by means of hay-seeds not expressly intended for them.

We have succeeded in protecting such nests of kestrels as occur annually at Hedgeley. The young are safely reared, and, we find, take their departure after a very short sojourn with their parents. All the young of the year migrate in their first autumn, though the old birds may occasionally be seen in winter. The Club will be surprised to hear that this species is parasitical on the sparrow-hawk, so long as the latter is catering for its own ravenous young in the nest. I would not have believed this, had I not seen it day after day, a few years ago. A single kestrel was rarely absent from the top of a tall larch just over the nest of a pair of sparrow-hawks, which was placed midway up a Scotch fir close adjoining. On the ground below were the usual melancholy records of indiscriminate destruction by the parent sparrow-hawks. Remains of blackbirds, thrushes, young pheasants, young wood-pigeons, an old peewit or two. Inside the nest six ravenous young furies. I would not allow the dam to be taken, nor her mate, being mindful of the noble injunction in Deuteronomy, the first and best of legislation on such subjects. But there was no choice but to wring the necks that called forth all this murderous activity—those of the voracious young inmates of the nest.

The kestrel too had unquestionably robbed the larder whenever he saw an opportunity, and carried off the spoils to his own mate and young, instead of going to hunt for mice. In fact, he is a general parasite.

One day I observed a kestrel hovering an unusual time in one place—so long, that curiosity led me to walk towards the spot. Ere long I perceived a cat with a live mouse on a gravel walk. This scene was the kestrel's attraction. He was hovering till the cat should give him an opportunity to stoop and sweep the mouse away from her for his own benefit. A tame kestrel will face a cat without fear, which is surprising enough.

The merlin always visits Hedgeley in spring and autumn.

One day I saw a merlin take an old cock blackbird just as the male sparrow-hawk, not much larger, habitually does. I ran up, when the blackbird was released just in time, and the splendid little hawk, with long acutely-pointed wings, rose like an arrow from the ground. Their ordinary prey is larks and starlings.

Occasionally a peregrine falcon would come and sojourn with us for a week or two in winter, proclaiming her or his presence by the remains of cushats stricken down and devoured. Such a visitant was always deemed an honour.

Over no fewer than fourteen winters, in all, we were regularly, or all but regularly, visited by a single rough-legged buzzard. It seemed to feed mainly on moles and water-rats; perhaps too on carrion. It never meddled with a pheasant, and was never itself shot at, as we found it harmless. It became gradually lighter in colour. Finally it departed one spring, and was not seen again. It never was accompanied by a mate. The flight was stately and aquiline. Pheasants were numerous where it most haunted, but evinced no fear of it, nor did it ever seem to heed them or to watch their movements.

The heron, I rejoice to say, breeds at Hedgeley on spruce firs planted by myself in 1828, and has done so for these ten years past, though only in some two or three nests. Thus a planter has been spared to hail the heron rearing its young upon the trees which he himself inserted. There is something very wonderful in the ability of the heron to endure our winters. The stork and crane betake themselves to warm latitudes with their ample wings, which they move with adequate muscular power. But the heron always seems to carry far too much sail for his strength. If you come upon him unawares by the riverside, he is in a terrible flurry to get away, though you have no gun, and, if you had, would never seek to harm him. Wherever there is a pond with frogs in it, thither will come those ubiquitous intruders, the common rats, to feed on them. Thither too will come the heron, for he dearly likes a frog, and next to a frog a half-grown rat. Even the largest rats are very shy of him, for he strikes like lightning at the back of the head or at the eye. If he haunts a pond the rats will not stay long.

But how does he stand a temperature of twenty or thirty below freezing (of Fahrenheit) by the river side among ice and snow, by moonlight? Look at his body, when he is killed at his fattest. How can he keep in his caloric when on famine rations? How can the egrets, and other delicate and slender-bodied birds of like conformation, endure the nocturnal cold of winter even in the warm countries on the Mediterranean Sea? for their body plumage is throughout light and open, and, one would say, quite inadequate. Our common heron is a good, if not an extreme example, owing to the northerly regions in which he can pass the winter. The solution lies in that ample and wonderful provision which we call his wings, but which is in reality wings *plus* a most ample folding mantle, to protect the meagre corporeal frame which it covers so completely. So far am I from having been at all shaken in my confidence in creative providence and design, by studying the principle and workings of evolution, that my faith in the great providential system and order of all things, which we call nature, is stronger than ever.

A great pleasure and source of instruction has accrued from examining all the productions of the natural world in their æsthetic aspect. The plumage of the peacock would indeed prove an amazing faculty for discerning true brilliancy, grace, and magnificence, in the poor little brain of his modest mate, if we could believe her to have helped to arrange it, by her preference and approbation. But one might admire her quite as much, could we attribute to her the smallest share in selecting the exquisite garb of the little chick which is evolved from her egg, even from the day when it first breathes the air. For a young peafowl chick a day, a week, a month old, or at any age, is a little thing of such beauty, of such harmony and delicacy of form and tints as few can justly appreciate. It is the same with even the tenderest young of most gallinacious birds, of the aquatic *anserinæ* and *anatidæ*, of the plovers, dotterels, and sandpipers. The forms, the colouring, the endless command of hues, with extreme frugality and economy in their application, the vivid contrasts and yet the pervading harmony. Peacocks and pheasants in adult plumage seem almost thrown into oblivion by these infantine little beings just issuing into life, changing in their aspect from week to week, but ever exhibiting something admirable. Take the shells from the bottom of the sea, as every collection presents them to us in their classified groups. We recognise at once the same Divine authorship of form and colour. They are objects exemplifying such mastery of contour and of colour, that in them may be recognised some of the highest sources of Grecian art; nay, moreover, of much in oriental or Indian adaptation in the arts of design. Indeed, the shells may be said to demand a Grecian eye to appreciate all their characteristic majesty of contour and vigour of conformation, which are, if possible, more admirable than their display of all that is loveliest in colour.

But the human form itself, and the aspect of our race in infancy, in childhood, in youth, and in old age, are no less within the domain of nature. It was the study of the noblest expressions of the countenance and gestures of the human family which enabled Italian painting to imagine, to embody, and carry out its great creations, which cease not to gather mankind to contemplate them from every region.

I am not of those who think that anything in nature, which the highest human intellect looks on with admiration beyond that accorded to it by common minds, was produced by mere naked and self-directed evolution, nor indeed that anything whatever was so produced. Stones thrown out by a volcano never fall down again so as to form a castle. One may believe in natural selection as a most important agency: it will account for much, and to trace and watch its workings is a noble study. But perhaps we may not understand it the less for regarding it as a directed agency, rather than a directing principle.

Few things are more worthy of attention, and none are more narrowly heeded by boys and young men, in reality, than the forwarning and admonitory characteristics of physiognomy, so common in the order of nature. Who does not see at once that he must beware, when he beholds a wolf? Beware of all beasts or insects striped like the tiger or the wasp. Distrust the zebra.

Mark the eagle's stern and pitiless eyebrow, and shun the imperious man whose eye and brow resembles the eagle's, unless some other countervailing features shall largely redeem his countenance. Only yesterday a fine bold little boy in his third year, and familiar enough with domestic beasts and birds, beheld a tame raven for the first time, quietly seated upon its perch. The child evinced a sudden terror and antipathy, perceiving at once that he was in the presence of danger, and of an enemy, that would inflict some cruel injury if it could. That child will be a shrewd physiognomist some day, if he be spared to scan and to encounter human rogues and ravens.

Repulsive, formidable, and disgusting is the dog-faced baboon of the Cape. Yet he has need perhaps of some special ferocity to defend his female and her young offspring from wolves, and himself from the dreaded panther. He may not be so wicked after all as he looks. The vultures, and the adjutant-bird of India are in ugly and unpleasant conformity with their habits as scavengers and devourers of carrion. Ghastly is the hyena, as behoves his nightly plundering of the graves; horrible and hideous the forms of various rapacious fishes. Crocodiles, and most of the serpents, proclaim themselves to be fell and dangerous enemies to man. Other animals share his fear of them and his abhorrence. It is never safe to neglect the instinctive warning that we receive from the physiognomy of an animal.

Nature itself thus informs us that the world contains many a perilous presence; that we must walk warily and wisely to be secure, and ever prepared for self-defence.

The hideousness of some marine fishes and of certain reptiles is however sometimes of a self-protective kind. That of the common toad can hardly be surpassed. But if its aspect is as disgusting to animals that prey freely on the frog, such as rats, foxes, foumarts, and cats, as to mankind, then ugliness is protective to it. That this may be so as to rats, and also cats, I have strong reason to believe; for one or two toads were always to be found in a particular flower-border constantly visited by rats, and where no frog could have lived twenty-four hours.

Cats too were always on the look out there. Yet the toads were never absent during summer. The rats never touched them, and if *they* abstained, probably a fox too would have done so. Dogs always show disgust at a toad. Hedgehogs however are perhaps the natural destroyers of these reptiles, so repulsive, though so harmless. Some of the fishes which look hideous, as set up in glass cases in museums, do not habitually present any such appearance, but only inflate themselves and erect their formidable spines when threatened by an enemy.

Nevertheless the devil fish of our coasts, and many other forms of warmer seas, are of awful hideousness to the human eye, far surpassing any results of mere brute evolution, non-intelligent and inexpressive, that I am able to conceive of. It is as impossible to me to ignore them as not to see that the oak and the pine, the flowers of the field, the shells of the sea, (the pencillings on the plumage of a thrush, a linnet, or a lark,) are all works of design, akin to works of the very highest grades of human intelligence and skill, yet infinitely more marvellous.

If we turn our thoughts from such reflections as these to practical observations, in detail, on a branch of natural science so popular and unceasingly attractive as British ornithology, it will be seen that much yet remains to be done which could not be effected in the days when no railways existed, such as now enable us to pass from the north to the south, from the east to the west, so easily within a day's compass. We ought now to be able to trace, with far better results than our fathers, the movements of a large number of birds which ought to be denominated semi-migratory, or *pullo-migratory*; since their yearlings, (their progeny of the recent nesting season,) instinctively seek refuge in warmer tracts, as the days become sensibly shorter, and the nights cooler; often, indeed, they pass over to the Continent. Meanwhile frequently the parent birds remain at home, doubtless as being hardier of constitution and well-seasoned to the climate. And as these latter are seen the whole winter long, not far from their usual haunts, the great migratory departure on the part of their yearling young has been hardly suspected.

That the mistle-thrush, or scricket assembles into small flocks of some thirty, fifty, or a hundred birds, in August and September, is indeed commonly known; but as a few pairs of old birds may always be seen in almost any woody neighbourhood during winter, those flocks that were so conspicuous at the close of summer are sometimes thought to have dispersed themselves again, or even to have been shot. But they are much too wary for the latter fate. The solution, as respects them, unquestionably is, that these flocks were composed of young yearling birds, *pulli turdini*, bent upon a bold but gradual progress towards the most promising quarters for autumn and winter, that is, districts rich in berries of hawthorn, service, yew, juniper, ivy, holly, sloe, and mistletoe. Of such provisions our northern flocks of this bird may be supposed to find an ample store in the midland counties, over which they will roam throughout the winter.

Meantime those bred in the midlands, from a like instinct prompting them to use their youthful wings, are moving into the southern counties, always well stored with berries of every kind. But similar August flocks of missel-thrushes, bred in the southern orchards amidst all this plenty, will yet be restless and discontented, till some fine morning, with a sharp frosty wind to waft them, they will strike away boldly over the sea for Normandy. They little know that the French fowlers are in full expectation of their arrival, and have set hundreds of horse-hair springes for them in the woods and coppices, all nicely baited with bunches of berries, which are hung on twigs behind the fatal running nooses. Such devices were totally unknown at home among the beef-eating Saxons, and the capture is often very successful.

Let us turn to the yearling young of our common song-thrush, which breeds in such numbers in the North of England. They find room in the southern counties, from whence, in like manner, a large arrival takes place every autumn of these lesser *grives* on the French coast; no doubt coming mainly from the South of England, impelled by love of youthful flight and zest for change of food; for have not a few old travellers, that lead them, hinted of a berry far richer than any in England, and cultivated on all the sunny hill-sides? So over they go; for *turdus musicus* can fly fast and strong, especially in the gloaming, and equally by moonlight. They will often be accompanied by redwings, *turdus iliacus*, bent on just the same errand, but coming from Norway.

An attentive observer will detect this progressive southerly movement of young thrushes in September. It is conducted in a gregarious manner, though straggling, and chiefly from one range of hedges or sheltering fields of turnips to another. Turnip and potato crops are full of thrushes at this season, but they become scarce before November. As an autumnal dainty they are sold in great numbers in all the French markets, being esteemed equally with redwings.

Meantime, however, the movement is one of *pullo-migration* again; for most of the old birds remain at no great distance from their summer haunts at home.

There is, after all, one very remarkable distinction between the thrush and the blackbird in winter, which enables the latter species to sustain itself much better in our northern climate. The thrush cannot be induced to follow the example of the sparrow, and to feed on whatsoever morsels of farinaceous food may be thrown out of houses and cottages either by accident or with a kindly purpose: whereas the blackbird becomes to a great extent a dependent on human goodwill or forbearance in Britain during its season of scanty sustenance. But though thus somewhat protected among rural homesteads, it is made to pay a heavy tribute to idle gunners in populous vicinities, when frost compels it to leave its woody haunts and approach the open highways.

We may reasonably doubt whether *turdus merula* often leaves England to cross the channel; certainly neither France nor Belgium can boast of the music of this full, clear, and sonorous songster of the warm vernal shower, or the dewy eve, as we can always be sure of it ourselves.—The blackbird is most plentiful in Britain.

At Brussels, I remember, the merle was deemed a sort of royal bird, inasmuch as he was hardly to be heard in the beautiful shrubberies and gardens near the city, but was protected by the King in the park and woodlands around the palace of Laaken.

I fear there is only one ornithological visitant of comparative rarity that can be mentioned to the Club as having established a claim of domicile in our grounds at Dunston Hill, situated as they are so near to the populous villages that lie towards the Tyne in the lands below. But the hawfinch, *loxia coccothraustes*, has visited us, though at long intervals of years. On the last occasion five birds came together, which, finding but few berries on the yew trees, departed again next day, with the exception of one, a female, which perhaps lost the others. She received the protection that was in readiness for them all, and remained through the whole winter, feeding on haws and keeping company with blackbirds and redwings. We have now a greatly increased assortment of yews, so that, I hope, hawfinches may return and rest securely here.

We used to have jays in plenty, and could now easily recolonize with young ones; but I hesitate, since they plunder sadly the nests of thrushes and blackbirds. A very little protection will suffice for jays; so crafty and watchful are they against all intrusive strangers who might come in quest of them. Indeed their cries of suspicion and alarm give valuable notice to all, whenever trespassers are in the woodlands. The jay is becoming so rare that to afford it some countenance almost becomes a duty, when one has abjured pheasants as inadmissible in a populous neighbourhood. For it is on behalf of pheasants and their eggs that the beautiful jays are proscribed from parks and pleasure grounds, with so little compunction.

> Then let us hope that e'en the jay
> May claim, on Tyne, her holiday.

At the close of the late most trying and exhausting winter it is a gladness to see the peewit resume his gambols, and to hail our happy aerial friends the skylarks in yet undiminished numbers. They must have flown far since autumn; as far as Devon perhaps. I have long thought the heel-claw of the skylark and its congeners one of the clear demonstrations of beneficent design in organisation, to enable ground-roosting diurnal birds, of small specific gravity, to pass the night, not squatting, but crouching, and fronting the storm, without being either blown away or frozen to the ground. Neither the skylark, nor any of its congeners, could roost upon the ground, as they do, in winter, and in rainy, windy weather, without the support of such a heel. They would be frozen to the ground. For they are diurnal birds, and sleep soundly at night. They do not keep shifting their position, like the wakeful peewit and gold-plover, the dotterels, etc., nor can they betake themselves to hedges, like the buntings, when the ground is wet. Hence I take the liberty of reading the lesson of the lark's heel in my own way, heedless of all that evolution has yet adduced, however interesting. The pipits and the wagtails are enabled, by their heel-claws, to face the wind upon naked rocks and on the roofs of houses, during the daytime, with wonderful success.

It might not be out of place to record here some evidence of the power that is possessed by the birds denominated waders,—all the tribes of *charadrius*, *tringa*, *totanus*, *scolopax*, and the like,—to save themselves from inundations by swimming, like ducklings, whilst they are in the young and tender state, that is, mere chicks, or if more advanced, still unable to fly. Without wasting words to demonstrate this, which will not be questioned, let me mention a remarkable instance of adult birds reposing upon the sea, which fell under my notice some years ago. It was during a passage by steamer down the western coast of Spain and the coast of Portugal, in the latter part of September. We were some six or seven miles from the coast, the cliffs, shores, and bays of which were all perfectly visible through the pearly summer haze of the climate; the weather serene, the sea unruffled, but heaving majestically with a grand long easy swell from the westward. The gannets from our own British coasts were in great force already thus early, but still more interesting were the easy muscular flight and graceful sweeping evolutions of numerous birds which I believe to have been shearwaters in the immature plumage.

Yet what was very remarkable was to see birds of our shore-plover and sandpiper tribes reposing quietly upon the sea, as if to enjoy their day-slumber; and this was observable for a long time as we went along, though the birds were not very numerous nor many together. Whenever we disturbed one or two they rose with the utmost ease from the ridges of the swell, and alighted again on one side or other of our track.

Their object was plainly merely to repose and to sun themselves, before returning to the coast to feed at ebb-tide, in the evening.

But why had they come out so far to sea for this purpose? Most likely to avoid the *Falconidæ* so numerous everywhere about the cliffs on those coasts, whilst again the warm temperature of the sea rendered its surface pleasant to them.

This interesting lesson, as to the habits of these waders, seemed to throw new light, for me, on the migration of woodcocks between Norway and Britain, often with but little apparent fatigue. I can conceive they may very safely rest for a short interval upon the sea, whenever it is not disturbed by broken water; that the little judcock does the same—and that corncrakes can equally do so when crossing the channel in spring and autumn. I am inclined to think that the waders, which we saw resting so much at their ease on the sea, off the west-coast of the Peninsula, were chiefly (from their size and rather light-coloured plumage) *Totanus glottis*, the greenshank.

On the shore of Ullswater I once saw a common sandpiper suddenly fly off on to the lake; when the cause of this movement became clear, a sparrow-hawk showing itself in pursuit. The sandpiper however alighted on the water before it was overtaken, and dived just in time. On this the hawk gave up the chase and withdrew. Presently the sandpiper re-appeared on the surface, but remained in that safe position. That such a bird should be able to dive quickly and successfully even once, gave me no small surprise.

Equally unexpected was the following way of acting in the young of the peewit, which I witnessed when strolling one day along the margin of a large pond, formed by Lord Ravensworth, near the Bridge-of-Aln, not far from Whittingham. A pair of peewits disturbed my meditations by dashing continually as close to my head as they dared. Having no wish to endanger their eggs or young by trampling on them, I halted and looked closely at the ground, when a little chick, one of the objects of their solicitude, was seen squatted within an inch of my shoe. I picked him up. He was just emerging from the downy state into incipient plumage, and his little crest was already distinctly budding. He had been found within a foot of the water, but I set him down about a yard off it, lest he should fall in. To my amazement, no sooner was he free than he ran straight to the water and at once launched himself on its gently rippling surface. Away he went, in no great hurry, but steadily and speedily, at the same time looking round ever and anon, as if to say, "Come and catch me again." And instead of making for shore in distress, he stood right out to sea, till he fairly crossed the pond at its broadest part, which must have been a width of thirty or forty yards; and this without the slightest faltering or sign of fatigue. It was one of the most instructive lessons in ornithology I ever received.

In the dredging operations of the Tyne, in the neighbourhood of the King's Meadows, some noble trunks of oak trees have been brought out of the bed of the river and towed to the northern shore, where they now lie. I have not yet been fortunate enough to visit the spot at perfectly low tide, when the finest of them may be examined and measured; but from all that has been said of it, the tree must have been not only of stately growth and great dimensions, but freely developed in the shelter of a forest, where it was protected from the winds.*

Let me urge some of our members to look well to these trees, and any others that the dredging-vessels may bring to light, for I feel no little self-reproach and regret, to have known of them as early as last spring, and yet to have only so lame a story as the present to tell concerning them.

Finally, with renewed thanks to the "TYNESIDE NATURALISTS' FIELD CLUB," for having called me to fill the office of President once more, and at the age of threescore years and ten, I must close this somewhat too long address.

* A lesser tree (which was above water at the time when I reached the place where they had been deposited) was quite of this free-grown, close-forest type. It was an oak, apparently sound, and has been prostrated whilst yet in its full vigour, probably by an encroachment of the river-current upon the forest.

THE FIELD MEETINGS for 1875 were arranged to be held as follows:—

MAY	South Shields.
JUNE	Ebchester and Chopwell Woods.
JULY	North Tyne, near Wark.
AUGUST	Holy Island.
SEPTEMBER (two days)	Roseberry Topping and Ayton.

THE Treasurer's report (see p. 192) was read and adopted.

THE following gentlemen were elected officers of the Club for the year 1875–6:—

PRESIDENT.

Rev. George Rome Hall.

VICE-PRESIDENTS.

Joseph Blacklock, Esq.	D. O. Drewett, Esq.
R. Fell, Esq.	John Philipson, Esq.

Ralph Carr-Ellison, Esq.	Rev. A. M. Norman, M.A.
Rev. J. F. Bigge, M.A.	Rev. J. C. Bruce, LL.D.
D. Embleton, Esq., M.D.	Rev. A. Bethune, M.A.
R. Ingham, Esq.	E. J. J. Browell, Esq.
Sir W. C. Trevelyan, Bart.	Rev. R. F. Wheeler, M.A.
T. Sopwith, Esq., F.R.S.	G. S. Brady, Esq., C.M.Z.S.
Rev. H. B. Tristram, F.R.S.	G. C. Atkinson, Esq.
George Wailes, Esq.	H. B. Brady, Esq., F.L.S.
Rev. G. C. Abbes, M.A.	Rev. J. E. Leefe, M.A.

TREASURER.

Robert Y. Green.

SECRETARIES.

Thomas Thompson.	D. P. Morison.

COMMITTEE.

Thomas Atthey.	Prof. A. F. Marreco.
W. Dinning.	G. H. Philipson, M.D.
J. Hancock.	W. M. Wake.
R. Howse.	E. C. Robson.
W. Maling.	John T. Thompson.
T. W. Backhouse.	Dr. Hooppell.

AUDITORS.

J. S. Foster.	T. P. Barkas.

THE following gentlemen were elected members of the TYNESIDE NATURALISTS' FIELD CLUB during the year 1874–75 :—

At the ANNIVERSARY MEETING, 1874 :—The Right Hon. the Earl of Durham; Messrs. Robert Blackett, Newcastle; Edward Carr, Whickham; W. P. Grace, Scotswood; H. O. Bell, Tynemouth; J. S. Charles, Gainford.

At the SECOND FIELD MEETING :—Messrs. James Wilson, Jos. Cobb, jun., H. A. Cave, F. C. Huntley, and Alfred Thompson, Sunderland; Dr. F. A. Lees, Middleton-in-Teesdale; Edward Oliver, Benton; George E. Spencer and John Ridsdale, Newcastle; T. J. Bungey, Spennymoor.

At the THIRD FIELD MEETING :—Messrs. S. E. Robson, T. F. Hopgood, and F. Ranson, Sunderland; R. A. Worswick, Gateshead; T. H. B. Heslop, Houghton-le-Spring; George Clarke, Featherstone; W. H. Thirkell, Sunderland; David Burn and Rev. W. Vaughan, Haltwhistle.

At the FOURTH FIELD MEETING :—Messrs. John S. Barwick, Sunderland; H. A. Bagnall, Winlaton.

At the FIFTH FIELD MEETING :—Messrs. George H. Wraith, Spennymoor; Benjamin Shaw, Newcastle.

At the EVENING MEETING :—Messrs. John R. Young, Newcastle; John Geo. Fenwick, Bulman's Village; W. A. Carins, Byker; Frank Charlton, Morpeth.

THE TREASURER IN ACCOUNT WITH THE TYNESIDE NATURALISTS' FIELD CLUB.

Dr.	£	s.	d.	Cr.	£	s.	d.
1874.				1874.			
To Balance	52	12	6	By Commission	7	6	3
,, Subscriptions	147	10	0	,, Printing "Transactions"	96	14	8
,, Sale of "Transactions"	30	14	2	,, Printing Circulars	26	16	11
				,, Postage and Sundries	9	0	0
				1875.			
				" Balance	90	18	10
	£230	16	8		£230	16	8

Account Book, May 8, 1875.—Examined with vouchers, and as to additions, and found correct,

(Signed) J. S. FORSTER, T. P. BARKAS, } AUDITORS.

PROCEEDINGS OF ANNIVERSARY MEETING, 1874, ACCIDENTALLY OMITTED FROM PAGE 118.

THE FIELD MEETINGS for 1874 were arranged to be held as follows:—

MAY	Croxdale Woods.
JUNE	Rothley Lake.
JULY (two days)	St. Abbs' Head.
AUGUST	Tindale Tarn and Blackburn
SEPTEMBER	Hartlepool and Seaton Carew.
OCTOBER	Chester-le-Street.

THE Treasurer's report (see p. 195) was read and adopted.

THE following gentlemen were elected officers of the Club for the year 1874–75:—

PRESIDENT.

Ralph Carr Ellison, Esq.

VICE-PRESIDENTS.

Thomas J. Bold, Esq.
J. Clephan, Esq.
Joseph Blacklock, Esq.
D. O. Drewitt, Esq.

Rev. J. F. Bigge, M.A.
D. Embleton, Esq., M.D.
R. Ingham, Esq.
Sir W. C. Trevelyan, Bart.
T. Sopwith, Esq., F.R.S.
Rowland Burdon, Esq.
Rev. H. B. Tristram, F.R.S.
George Wailes, Esq.
Edward Charlton, Esq., M.D.
Rev. G. C. Abbes, M.A.
Rev. A. M. Norman, M.A.
Rev. J. C. Bruce, LL.D.
Rev. A. Bethune, M.A.
E. J. J. Browell, Esq.
Rev. R. F. Wheeler, M.A.
G. S. Brady, Esq., C.M.Z.S.
G. C. Atkinson, Esq.
H. B. Brady, Esq., F.L.S.
Rev. J. E. Leefe, M.A.

TREASURER.

Robert Y. Green.

SECRETARIES.

Thomas Thompson.	D. P. Morison.

COMMITTEE.

Thomas Atthey.	William Maling.
T. W. Backhouse.	Prof. A. F. Marreco.
William Dinning.	G. H. Philipson, M.D.
John Hancock.	E. C. Robson.
Rev. R. E. Hooppell.	John T. Thompson.
Richard Howse.	W. M. Wake.

AUDITORS.

J. S. Foster.	T. P. Barkas.

THE following gentlemen were elected members of the TYNESIDE NATURALISTS' FIELD CLUB during the year 1873–4:—

At the ANNIVERSARY MEETING, 1873:—Messrs. Charles Lilburn, T. O. Guthrie, J. Guthrie, and T. Taylor, Sunderland; John H. French, South Benwell; T. E. Vasey, South Shields.

At the FIRST FIELD MEETING:—Messrs. J. T. Leather, Middleton Hall; Edward Bolam, Stella; Edward Eccles, James Stuart, and Oscar Linguist, Newcastle; Rev. W. A. Clark, Belford Hall; Rev. E. N. Mangin, Woodhorn.

At the THIRD FIELD MEETING:—Mr. Christopher Heslop, Newcastle.

At the FOURTH FIELD MEETING:—Messrs. S. R. Vann, Durham; John Shiel, Usworth; R. T. Shiel, G. R. Shiel, and R. Hutton, Sunderland; Charles Southwell, London; M. Hutton, Cheadle, Staffordshire.

At the FIFTH FIELD MEETING:—Messrs. C. Gilchrist, Fence Houses; S. Robson, Gateshead.

CHIPCHASE CASTLE.

NORTHUMBERLAND.

THE TREASURER IN ACCOUNT WITH THE TYNESIDE NATURALISTS' FIELD CLUB.

Dr.				Cr.			
1874.	£	s.	d.	1874.	£	s.	d.
To Subscriptions	154	11	6	By Balance due Treasurer	2	14	2
,, Natural History Society One Hundred and Fifty Copies, Vol. V., Part 1	8	15	6	,, Printing "Transactions"	65	9	8
,, Half Expense of Authors' Copies	1	5	11	,, ,, Circulars	28	7	4
				,, Commission, collecting	7	11	8
				,, Postage, etc.	7	17	7
				,, Balance	52	12	6
	£164	12	11		£164	12	11

1874, May 6.—Examined and found correct,

T. P. BARKAS, Auditor.

XIII.—*On the Skull and other Bones of Loxomma Allmanni, Huxley, from the Low Main, Newsham, Northumberland.* By DENNIS EMBLETON, M.D., AND THOMAS ATTHEY. WITH FOUR PLATES BY WILLIAM DINNING.

IN the "Annals," 1870, V., p. 374, appeared a paper by our late lamented friend Mr. Albany Hancock and Mr. Atthey, "On the Occurrence of *Loxomma Allmanni* in the Northumberland Coal-field." In the same periodical, 1871, VII., p. 73, and in the "Nat. Hist. Trans. of Northumberland and Durham," Vol. IV., pp. 201, 1871, and 390, 1872, they noticed and partially described another skull of *Loxomma* which had been met with in the same part of that coal-field by Mr. Atthey.

This specimen, being the most complete that has yet been found here or perhaps elsewhere, and wanting but little to make it perfect, demands a detailed description.

The skull has suffered strong compression almost directly downward, with an inclination from right to left.

The upper surface and right border are perfect; but the border of the left maxilla is deficient. The two halves of a lower jaw, right and left, and of the same size, were found near the skull, to which, as they fitted it, they most probably belonged. In addition to the skull and mandible, there were discovered, at about the same time and place, vertebræ, ribs, and bones of the extremities, presumably belonging to the same animal; these were not very numerous, but were by far the most common bones of Labyrinthodonts of any size that were met with: and they differed thus considerably from those of *Anthracosaurus* and of *Pteroplax*, the only other large Labyrinthodonts that have as yet been found in the Northumberland Coal-field.

The present paper contains a description of the cranium, mandible, and teeth, and a notice of the vertebræ, ribs, and other bones, in the following order, namely, the upper surface of the cranium, the under surface, the occipital surface, the mandible and teeth, and, lastly, the vertebræ, ribs, and bones of the extremities.

I. *The upper surface of the skull* is represented in Plate I.

Viewed thus the skull of *Loxomma* resembles generally that of *Archegosaurus* and the Crocodilia, and of the latter the Alligator rather than the Crocodile; the snout, however, is broader than that of the Alligator, as is the whole skull, and the posterior lateral expansions of the cranium for the articulation of the mandible project a good deal further backward beyond the occiput than in the above-named animals.

The length of the skull along the median line, from the end of the snout to the posterior edge of the occiput, is twelve and a half inches, from the same point to the end of the lateral expansion above the articular condyle fourteen and a half inches.

The breadth from side to side at the widest part, which is a little in front of the posterior edge of the occiput, is eight inches, over the posterior ends of the orbital vacuities seven inches, over the anterior ends of the same five inches, and over the broadest part of the snout three and a half inches. The snout is broadly rounded off and rather flattened in front.

This upper surface of the skull is nearly perfect; the sculpturing, the mucus-grooves, the nostrils, the orbital vacuities, the parietal foramen, the temporal fossæ leading to the external ears, are all distinct.

Each bone can, more or less clearly, be seen surrounded by suture; the sculptured pattern on the surface is the same as that described in the notice of *Loxomma* in the "Nat. Hist. Trans. of Northumberland and Durham, Vol. IV., pp. 201, 1871, and 390, 1872, namely, "the peculiar honeycombed or reticular structure;" but it is distinguishable from that of the other Labyrinthodonts.

On examining closely the hollows or pits of this surface, both of the cranium and mandible, one, two, or three minute but well-defined openings are seen passing into the bone, but only penetrating its outer table; when three of these exist in the same pit they are placed in a straight line: their use is enigmatical; perhaps they lodged minute glands for lubrication of the skin of the head. The skin we infer to have been naked.

The mucus-grooves on the bones, of which there are two pairs, run obliquely backward from the margins of the pre-maxillaries and maxillaries: the premaxillary pair commence at a point midway between the median suture and the opening of the nostrils, and are two and a half inches apart; thence they run backward and inward for a quarter of an inch, and are united by a groove running across the median line; beyond this transverse communication they pass almost directly backward for one inch and a half, and then abruptly cease, having been impressed for the last half inch upon the nasal bones: the maxillary pair, arising on the margins of the maxillary bones, a short way behind the widest part of the snout, and about a quarter of an inch behind the openings of the nostrils, run obliquely backward and slightly outward on the maxillæ, and are discontinued on the edges of the lacrymal bones.

The nostrils lie, therefore, between the premaxillary and the maxillary mucus-groove of each side, but nearer to the latter than to the former. They are openings of about half an inch diameter, nearly circular, and bounded in front by the premaxillaries, behind by the maxillaries, and internally by the nasal bones; their central points are three inches apart; and a line drawn across the nasal region between these points is nearly two inches behind the point of the snout. They are only about a quarter of an inch removed from the margin of the jaw.

The orbital vacuities are large, irregularly elliptical in outline, and diverge slightly from each other in front; each measures four inches and a half in length, and one inch and a half across the broadest part. The true orbits occupied only a portion of the vacuities at the posterior and inner part, as indicated by two nearly opposite and slightly prominent points on each margin which are best seen on the left side of the figure on Plate I. To these points ligaments and membranes, defining in front the proper spaces for the eyes, had been attached; on the right side the malar bone has been partially dislocated, and its inner edge driven a short way into the vacuity.

The parietal foramen, rather more than one-eighth of an inch in diameter, is formed equally by the parietal bones at the union of the posterior third with the anterior two-thirds of the interparietal suture. It is circular, perforates the top of the cranium, and opens below as a smooth, inverted funnel-shaped cavity.

The broad channels or fossæ leading to the external auditory openings, *the temporal fossæ*, are bounded on the inner side by the squamous and mastoid bones, and, notwithstanding that the skull has been subjected to immense pressure, are still seen to be at a somewhat lower level than those bones. They pass forward for about an inch from the external posterior angle of the mastoid, are rounded off outwardly in front, their floor becoming gradually more superficial on the supra-temporal bones; these constitute nearly the whole of their floor, the narrow parts of which left on the inner sides are supplied by the ossa quadrata.

External to these fossæ, extend broadly outward and backward, for nearly two inches behind the posterior border of the occiput, the posterior expansions of the sides of the cranium, or extensions of the maxillæ.

Individual bones.—These can be distinguished, with a little trouble, by observing the lines of suture along which they are united.

The premaxillaries form the whole of the front of the snout, and are firmly united on the median line; they are bounded bebehind, on each side of the mouth, by a small portion of the maxillaries, which in part they overlap; further in, by the nasal orifices, and next by the nasal bones.

The maxillaries occupy the edge of the upper jaw, from the outer ends of the premaxillaries and the nasal orifices to the suture uniting the malar and quadrate jugals, a distance of nine inches and a half; they are seen from above as far as a point nearly opposite to the middle of the length of the orbital vacuities. These bones nowhere measure more than three-quarters of an inch in breadth; behind the broadest part they rapidly become narrower, and form a mere bordering to the jaw, and are only here and there visible from above. Their inner borders unite in front for an inch with the nasals, then for two inches and three-quarters with the lacrymals, and further back with the malars.

They belong mainly to the under surface of the cranium, and will be noticed again in the description of that part.

The nasals lie immediately behind the middle of the premaxillaries and before the frontals; they are more expanded in front than behind, contributing to keep up the breadth of the muzzle, and occupying the whole space between the nasal orifices; they are bounded on their outer sides by the maxillaries, lacrymals, and prefrontals.

The lacrymals are wedge-shaped and pointed in front, occupying the angles left by the maxillaries and nasals, and are cleft behind, the outer division being larger than the inner, to enclose the anterior angles of the orbital openings. They are bounded by the nasals and prefrontals at their inner, and by the maxillaries and malars at their outer border.

The frontals are narrow and elongated, slightly broader behind than before, united in front to the nasals, behind to the parietals, and on their outsides to the prefrontals for three-fourths of their length, and to the postfrontals for the remaining one-fourth. The median suture unites them to each other.

The prefrontals, elongated and about half as wide as the frontals, become gradually wider from back to front; they rest upon the postfrontals behind, upon three-fourths of the frontals at their inner sides, and form three-fourths of the inner edges of the orbital openings at their outer side. Just in front of the suture uniting the pre- and postfrontals, at the outer margins of the bones, is a small but distinct prominence, marking the boundary, on that side, of the true orbit. In front, the sharply wedge-shaped ends of the prefrontals are received into retreating angles formed by the diverging sides of the nasals and lacrymals.

The postfrontals are rather more than half the length of the prefrontals, somewhat hatchet-shaped, the handle forwards, and joining the prefrontals; their inner edges are bounded almost equally by the frontals and parietals; posteriorly they abut upon the squamous bones, and externally, besides joining with the postorbitals, form smooth rounded concave edges, which look outwards and forwards, and constitute a considerable part of the inner border of the true orbit.

The parietals are a good deal shorter, but on the whole broader, than the frontals, with the posterior borders of which they articulate. They are much broader behind than in front, and are joined outside by the postfrontals and squamous bones, and behind with the pair of bones to be next mentioned.

The parietal foramen has been already noticed.

The pair of bones next behind and articulating with the parietals, and which, united on the median line, overhang the occipital segment of the skull, as the parietals themselves in most Vertebrata do, correspond to the pair called "supraoccipitals" by Von Meyer in his description of *Archegosaurus*, in his work entitled "Reptilien aus der Steinkohlen-Formation in Deutschland." They are irregular squares of about three-quarters of an inch on a side; their outer borders are bounded for a short space anteriorly by the squamous, and further back by the mastoids; behind they articulate on each side of the median line with the upper border of what appears to be the true supraoccipital, and, further out, slightly with the exoccipitals. They form with the mastoids the posterior border of the top of the cranium.

These bones do not exist in the Crocodilia or in the great majority of fishes, though they are present not only in *Loxomma* and *Archegosaurus* but also in *Pteroplax;* they do not appear either to form a part of the skull in any other of the Labyrinthodonts.* Occasion will be taken to notice these bones more at length under Section III. *Occipital Surface.*

The mastoids, which are squares of three-quarters of an inch, and form the posterior external angles of the upper middle cranial surface, lie external to, and join with, the last noticed bones; in front they abut upon the squamous bones; externally they are free, and bound the posterior part of the inner margins of the fossæ leading to the ears.

At the back part of the mastoids, and close under their external angle, is a somewhat obtusely pointed tooth-like process,

* Since the writing of this paper, we have found that these bones exist, well marked, in *Anthracosaurus*, as well as in *Loxomma* and *Pteroplax*, as will be seen in a description of the remains of *Anthracosaurus*, by Mr. Atthey, about to appear in the "Annals and Magazine of Natural History" for August, 1876.

directed backwards from the under surface of the bone, and marked by muscular impressions.

The squamous bones, of an irregular shape, lie external to the parietal, and form the anterior curved margins of the temporal fossæ, having the postorbital and the supratemporal, Huxley, the tympanic, Von Meyer, on their outer side. They are connected in front with the postfrontal and postorbital, and behind with the mastoids. By a small posterior part of their inner margins they are sutured to the so-called "supraoccipitals."

The postorbitals are of a somewhat rhomboidal outline; their anterior internal borders, concave, form the posterior and external margins of the true orbits; their inner angles, which are truncated, abut upon the postfrontals, which bound the orbits posteriorly and internally. These two bones, the postorbital and postfrontal, with a small portion of the posterior end of the prefrontal, form the whole of the bony margin of the true orbit. The anterior angles of the postorbitals project into the orbital vacuities, marking on their outer margins the boundary of the true orbit, as noticed already under the heading "*orbital vacuities.*" The postorbitals articulate by their inner and posterior sides with the squamous, and by their outer and posterior with the supratemporal of Huxley, the tympanic of Von Meyer. Their remaining sides, the anterior and the external, join with the jugal bones.

The malars or jugals are much elongated, and form the middle two-thirds of the external borders of the orbital vacuities (on the right side the bone, as already noticed, has been partially dislocated), and overlap by their external borders nearly six inches of the borders of the maxillaries: they grow narrower as they extend forward, and have a pointed end received into the angle formed by the diverging posterior edges of the maxillaries and lacrymals; extending backwards they become rapidly broader, and cease posteriorly in an obliquely running zigzag line of suture, which unites them, from within outwards, to the postorbitals, the supratemporals, and the quadrate jugals. The external borders of this upper surface of the maxillary part of the cranium are formed largely by these bones, and are completed in front by the maxillaries and premaxillaries, and behind by the bones next to be noticed.

The quadrate jugals, oblong in shape, complete the posterior three inches of the external, somewhat convex border of the maxillary part of the cranium; they articulate by their anterior ends with the malar, and by their internal edges, also convex, with the supratemporal, a small portion of this line of suture being reserved at the back part for connexion with the quadrates, together with which they form the great posterior external angle of the skull.

The supratemporals are much larger than the quadrate jugals, and are of an irregular oblong shape; they are bounded in front by the postorbitals and malars, externally by the malars and quadrate jugals; and posteriorly they overlap the quadrates. On their inner side they are opposed, first and in front, to the postorbitals, then to the squamous bones, and form, as before said, the greater part of the floor of the temporal fossæ, where they overlap considerably the quadrates.

The quadrate bones form only a narrow slip of the inner side of the floor of the temporal fossæ, and stretch as a rather narrow and irregular, border outwards and backwards to join the quadrate jugals; these form the extreme external angle of the skull.

The quadrates enter more largely into the formation of the under surface of the skull, and there, at the external angle, form the condyles for articulation with the mandible, and will be further described with the rest of the under surface.

II. *Under surface of Skull* (Plate II.)—The dimensions are here the same as those of the upper surface. The whole of the alveolar border of the left maxilla is wanting, except about two inches of the posterior end; and there are therefore on this side no maxillary teeth remaining. The right maxilla is very nearly perfect. The whole of the middle and posterior part of the palate is much depressed, except along the median line, where, for four inches from the posterior edge of the palate, exists a narrow ridge, formed apparently of the basal part of the presphenoid and perhaps of the vomer; from this ridge the palate-bones on each side have been broken off and pressed down to a lower level. At the beginning of the posterior third of this ridge there is an oblique fracture through the presphenoidal part; in front of the fracture the ridge tapers gradually to a point, which is probably the anterior end of the median part of the vomer, and where it is joined by the vomerine palate-plates.

The teeth are all broken off at about the level of the alveoli, except four on the right side. The whole surface of the palate between the palate-plates of the maxillaries, namely, the palate-plates of the palate-bones and of the vomers, are covered all over with small, somewhat pointed, and thickly set granulations; the vomerine and premaxillary divisions of the palate are the strongest parts of the upper jaw. There is no anterior palatine foramen.

The malar or zygomatic arches are open and wide, being about four inches long by two inches at the widest part, and of an elongated ovoid shape, their apices pointing forwards.

The posterior nares are placed far back, at the posterior part of the pterygoids, and close together, but distinct from each other.

Behind the nares are two bony projections, apparently from the basisphenoid; this bone is difficult to define, but is attached to the apex of the basioccipital behind. This is of a triangular form; and its forward-pointing apex is wedged in between the converging posterior lateral projections of the cranium, bordered by the ossa quadrata. At its base is seen the cup-shaped cavity for articulation with the body of the atlas.

Individual bones.—The premaxillaries are well preserved, and are firmly united by the median suture; their alveolar border or arch is somewhat elevated above their palate-plates, and contains four teeth on each side of the symphysis; all are broken off on a level with the alveoli.

In another specimen of *Loxomma* in Mr. Atthey's possession there are five teeth on the right and six on the left side.

The last two teeth at the extremities of the premaxillary arch are only half the size of the others, and are placed nearer to each other than the rest are.

Each dental interspace is fully occupied by a wide and deep depression, which varies in size with the distance at which the teeth are apart. These depressions, it has been said, are destined for the reception of the points of the mandibular teeth when the mouth is closed; as, however, we doubted the correctness of the assertion, Mr. Atthey made transverse sections through these depressed spaces and the adjacent parts of the jaw, taking in some of the teeth; and then, under a low magnifying-power, we discovered in each case, a little below the surface of the depression, the remains of the root of a former tooth. Depressions of the same character existing along the alveolar border of the maxillæ were next, in several instances, similarly examined in section, and with the same result; the remains of a tooth existed in each. These depressions, therefore, instead of lodging the teeth of the other jaw during closure of the mouth, are the vestiges of former alveoli from which old teeth have been shed. Besides, it can be shown that the teeth of the mandible are not received into these depressions when the mouth is closed; for the upper jaw, forming the larger arch, must, when the mouth is shut, enclose the corresponding part of the mandible; moreover the teeth of the mandible, when the mouth is closed, do not otherwise correspond to the depressions of the maxilla.

The median suture between the premaxillaries is distinct, and is thence continued backward, first between the vomerine palate-plates and then between those of the palate-bones and the pterygoids as far as the posterior border of these last.

At the posterior border of the premaxillaries this suture is crossed by a transverse one, uniting these bones with the vomerine plates. The latter suture is projected forwards on the median line by a rounded prominence of the vomers; from this on each side it curves forward and outward and then backward, thus surrounding a considerable part of the base of the vomerine tusk, from which it is distant only by about an eighth of an inch. It terminates at the borders of the jaw, uniting at that part the contiguous ends of the premaxillaries and of the alveolar borders of the maxillaries.

The vomers, immediately behind the premaxillaries, stretch almost entirely across the palate, and are separated from the border of the jaw only by a narrow strip of the maxillary alveolar border; their external anterior angles have the large tusks, hence called vomerine, implanted in them: behind each of these is a large depression, each a little larger than the base of the tusk, and resembling those of the premaxillary interdental spaces; and further back there is an aperture on each side in the jaw, presently to be noticed.

The outer borders of the vomers are next directed backwards and inwards for about one inch and a half; thence they run abruptly inwards and forwards, converging to the median line of the palate. The angles they thus form together are inserted between the palate-bones on the inner and the maxillaries on the outer sides.

The vomerine tusks present a clean fracture of circular outline, with a diameter of seven-tenths by five-tenths of an inch.

The apertures above noticed in the jaw are obscure; they do not pass through the jaw to its upper surface, but merely pierce the nasal cavity. They are not in connexion with the anterior nares. In *Lepidosteus*, a short way behind the snout, there is, on each side of the median line, a complete perforation of the maxilla for the reception of a mandibular tooth during closure of the mouth. Perhaps the apertures in *Loxomma* have the same use; they are of about the same size as the depressions in front of them, and are bounded internally and in front by the vomers, externally by the alveolar borders of the maxillæ, and posteriorly by the anterior ends of the palate-plates of the same bones.

The maxillaries are the longest bones of the skull, and consist of alveolar borders and palate-plates. On the right side the alveolar border of the bone is very nearly perfect, whilst that on the left side is nearly all wanting. The palate-plates are perfect on both sides.

The alveolar border is a narrow tract of bone, eight inches and a half long, extending from the premaxillary to the quadrate jugal, with which latter it articulates at about three inches and a half in front of the posterior end of the lateral part of the cranium. The border which remains bears thirteen small teeth irregularly disposed, and has four gaps from which both bone and teeth have disappeared. It is highly probable that the teeth had originally been more numerous; for in another specimen, in Mr. Atthey's collection, of the skull of *Loxomma*, in which the maxilla measured in length very nearly the same as that of the specimen before us, there were twenty-four teeth easily counted.

The inner edge of the alveolar border towards the front is depressed for the space of one inch and three-quarters below the level of the outer.

The palate-plates of the maxillaries are about six inches and a half in length, with an average width of one inch, and extend from the aperture in the jaw and the vomerine plates backwards to articulate with the malars and ectopterygoids. Each is transversely divided into two, if not three, pieces, there being an undoubted suture at the distance of two inches from the anterior end of the bone, and a doubtful one at nearly the same distance further back; the supposed third piece bears no tooth.

The first piece of the palate-plate, a little broader than the others, lies between the alveolar border externally and the vomers and palate-bones internally; in front it forms the posterior margin of the aperture in the jaw; and immediately behind this edge occurs a large round depression, behind which again is a tusk, but one of smaller diameter than the depression; the tusk is only three-quarters of an inch in diameter, and its outline is more circular than that of the vomerine tusk.

The second piece is bounded laterally by the alveolar border and by the palate-bones, and bears, at a distance of one inch and a quarter behind the last-named tusk, another, which has a diameter of only half an inch; and behind this is a depression much larger than the tusk itself.

The third piece, indistinctly divided from the second, is bounded laterally by the alveolar border and the malar externally and the palate and ectopterygoid internally; and its posterior extremity forms a small portion of the anterior boundary of the zygomatic arch.

The palate-bones are long and rather broad, occupying a large space on each side of the median line; together they have an ovate-lanceolate form, pointed in front and inclosed on each side for about an inch by the vomers, behind this by the palate-plates of the maxillaries, and next by the ectopterygoids. Their posterior ends abut upon the pterygoids; but no connecting suture can be made out.

Had the skull not been so much crushed, these bones would, probably, have been found united by suture along the whole of their inner edges; as it is, they have, as before mentioned, been dislocated from the lower edge of the vomer and presphenoid for a considerable distance along the median line, and can be observed lying apart with their serrated edges well preserved, whilst the presphenoid and vomer form the ridge already named as projecting between them.

At the posterior termination of this ridge two pits, one on each side of the median line, mark the position of the posterior nares. Behind these are two projections opposite to each other and about half an inch apart, probably belonging to the basisphenoid; they are sharply defined posteriorly and internally, and slope downwards on their anterior and external sides. A well-defined smooth groove or channel runs along their bases on the inner and posterior sides from before backwards and is soon lost. A distinct suture follows this groove, lying on its outer edge. The grooves seem adapted for vessels or nerves; or it may be that they are vestiges of the lateral Eustachian tubes.

A transverse suture connects the posterior end of the median ridge before noticed to that part of the base of the skull immediately behind, which appears to be the basisphenoid, as it articulates, or is continuous posteriorly, with the apex of the basioccipital. The basisphenoid is difficult of definition, owing to the crushed state ef the skull.

The basioccipital. This is the somewhat triangular piece, which, by its forwardly placed apex, articulates with the basisphenoid: its sides articulate with the quadrates; and its base is occupied by a deep cup-shaped cavity, in place of the convex condyles found in the Reptilia, for articulation with the body of the first cervical vertebra. The surface of the bone in front of the articular cavity is smooth and slightly convex; its sides. somewhat rough, are overlapped a little by the quadrate bones.

The articular cavity, much compressed, has an oval contour; its transverse diameter is one and four-tenths of an inch, and its depth considerable. In several other specimens of the basioccipital in Mr. Atthey's collection its outline is more regularly circular; these specimens are of various sizes, having belonged to examples of different ages.

Behind and below the cotyloid cavity, are partially seen the facets of the exoccipitals for articulation with the neural arch of the atlas. The foramen magnum is not visible in this view.

The quadrate bones can be distinguished as bounding by their inner borders the basioccipital triangle and the cotyloid cavity, and then running outward and backward to the posterior external angle of the cranium, joining there with the quadrate jugals and constituting the condyles for the mandibular joints. The condyles are almost transversely placed, but have a slight inclination forwards at their inner ends, about one inch and a quarter long, rounded from before backwards, and their ends somewhat raised above the middle, which is slightly depressed.

The quadrates at their internal ends are broad, and become gradually narrower as they are traced outwards to the condyles, where they are again enlarged. Their outer borders form a considerable part of the inner margin of the zygomatic arch; in front they appear to articulate with the basisphenoid and ectopterygoids and perhaps also with the pterygoids; but it is impossible clearly to make out these parts. On the left side the anterior terminations of the quadrate are hidden by the ectopterygoid, which has been dislocated and thrown over them.

The ectopterygoids complete the sides and back part of the bony palate by uniting with the palate-bones and the pterygoid; but the lines of connexion are not visible.

They are rather broad and strong and articulate behind with the quadrates; directed thence outwards and forwards they are sutured to the posterior internal extremity of the palate-plates of the maxillaries.

The malar or zygomatic arches, as seen from below, are thus circumscribed by the ectopterygoids, the posterior ends of the palate-plates of the maxillaries, and a portion of the alveolar border of the same bones, by the malars, quadrate jugals, and quadrate bones.

The inferior surface of another skull in Mr. Atthey's collection is shown, of natural size, in Plate III., fig. 1. The posterior part only is given.

III. *The Occipital Surface.*—It is impossible to estimate the height of the occiput, owing to the crushing it has undergone; it is much flattened, concave on the whole from side to side, that is, from the posterior external angle of one mastoid to that of the other; external to the occiput project backwards and outwards on each side the posterior lateral angles of the maxillary part of the cranium.

The upper border of the occipital surface is also the posterior border of the middle part of the skull, and overhangs slightly the parts beneath it. It is formed externally by the mastoids, and between them by the pair of bones corresponding to those which, in *Archegosaurus*, are called by Von Meyer, in his work before quoted, "supraoccipitals." Immediately below this border runs a transverse line of suture connecting the bones forming the border with those beneath it—namely, next the median line with the single and, as we deem it, the true supraoccipital, and laterally with the exoccipitals.

The supraoccipital is of a subtriangular form, wider from side to side than from above downwards, and situated on the median line. It is doubtful whether or not the median suture passes through it. Below it articulates with the exoccipitals.

The exoccipitals are a pair united by suture on the median line below the supraoccipital; they form the upper portion and sides of the foramen magnum; their upper borders articulate next the median line with the supraoccipital and then with the supraoccipitals of Von Meyer, and further out with the mastoids; their lower borders, external to the foramen magnum, rest upon the basioccipital, and have on each a projection posteriorly, terminated at its inner side by a flat rounded articular facet looking backwards, for articulation, doubtless, with the neural arch of the atlas. Between these facets is a notch, the uppermost part of the foramen magnum; the lowest part of the foramen is the upper edge of the cotyloid cavity of the basioccipital. Owing to the compression of the skull, the foramen, however, is not easily made out.

External to the facets there is on each side a rather pointed process, apparently for muscular attachment; and beyond these again, at a short distance, are the tooth-like processes of the underside of the mastoids, mentioned in the description of the upper surface of the skull.

Below these parts is the inferior surface of the skull, described in Section II.

IV. *The Mandible* (Plate III., figs. 2, 3).—Two half-mandibles, right and left, occurred, as is stated at the commencement of this description, two or three feet apart and not far from the skull; they are of the proper size to fit it, and most probably belonged to it.

The right half (fig. 2, half the natural size) is almost perfect; its alveolar border is quite so, it exhibits the teeth in a beautiful state of preservation; and its exterior is covered with the peculiar reticular sculpture. It measures nearly fourteen inches and a half in length, and at the widest part, which is about four inches from the posterior end, two inches and three-quarters in width; from this point it tapers gradually to the anterior end, where it is perfect, and little more than an inch in width.

A narrow groove can be observed to run nearly the whole way along the inferior border of the specimen, beginning below the articular projection; whether this is a mucus-groove, or what its signification is, is not easily determined.

The inferior margin is slightly convex; the upper or alveolar somewhat concave, with a slight eminence in front supporting the first large tooth. The anterior end terminates in a symphysis which is rather deep, and, as seen in another specimen, extended downwards and backwards, its depth being one inch and three-quarters, its breadth at top five-eighths of an inch, below which, it lessens to one quarter of an inch.

Near the posterior end the outer layer of the bone in our specimen is for a short space altogether wanting; but beyond this the articular end is well preserved, at least at the outer side. From this specimen, and from another in Mr. Atthey's possession, it can be discerned that the articular surface was a rather deep, transversely elongated, and smooth groove, rather more elevated in the middle than at the ends, for the reception of the condyle of the upper jaw, which was similarly elongated, and whose ends were gently raised above the level of the middle.

In another specimen in Mr. Atthey's collection, larger than the subject of this paper, the length of the articular groove on the mandible is one inch and three-quarters, the breadth half an inch, and the greatest depth a quarter of an inch. The posterior border of the articular surface curves upwards and forwards, so that the joint, though it was not interlocked, must have been pretty secure. The articular part of the jaw projects outwards from the plane of the ramus half an inch. The inner surface is not visible in this, but can be well seen in the other half-mandible.

It will be observed that the teeth in the right half are all entire, whilst those of both sides of the maxilla and, as will be seen in the sequel, those in the left half-mandible are all broken off short. The difference is thus accounted for: in the matrix they were all entire; but on this being broken up, the teeth, being firmly anchylosed to their sockets, could not come out; but the parts above the alveoli, being firmly imbedded and entangled in the matrix, have been broken away with it and lost; moreover the weakest part of the teeth is immediately above the alveolar border. In the case of the right half-mandible, which was obtained with the shale around it, this matrix has been carefully worked and cautiously chipped away, leaving the teeth *in situ*, exposed on their outer surface, but left supported by the shale on the other side.

There are upwards of twenty teeth in this half-jaw: seventeen or eighteen are well preserved; a dozen are entire. They vary much in size, and are irregularly arranged, in some parts being nearly in contact with each other, in others considerably apart. Three are much larger than the rest, and seem to correspond to the vomerine and palatal tusks of the upper jaw. These large teeth are one inch and a half long, and upwards of half an inch across at their bases. The first is placed an inch from the anterior end, upon the eminence already noticed as existing on the alveolar border; a single small tooth exists in front of this. The second large tooth is two inches further back, and the third one inch and one-eighth behind the second; the third is therefore three inches and one-eighth behind the first; but the apices of these two are four inches and a quarter apart, a distance very nearly corresponding to that between the depressions behind the vomerine and last palatal teeth of the maxilla. No interdental depressions are visible on this exterior surface. The smaller teeth vary from three-eighths of an inch to about three-quarters of an inch in length.

The left half-mandible, (Plate III., fig. 3 represents half the natural size of the fragment,) has been crushed, and the posterior part broken off and lost. The greater part, however, nine inches in length, the anterior end, remains in a good state (see Vol. IV. "Nat. Hist. Trans. of Northumberland and Durham," 1872, p. 392).

This fragment shows both inner and outer surfaces, and contains twelve teeth, of which three only are large; several gaps exist in the row, the teeth being irregularly placed.

The teeth as seen from the outer surface are, with one exception, broken off on a level with the outer alveolar border; but if we look at the inner surface, the alveolar border there is found to lie at a much lower level than the outer, forming an irregular undulating line seven inches in length along the jaw, extending from the front of the third tooth backwards to the fractured end; it descends gradually towards the middle of the jaw, and then similarly rises, approximating to the level of the outer border. This deficiency of the inner border, which at first looks like a fracture, exposes the inner surface of the teeth as far as to near their roots, and the depressions between the teeth appear as if in section.

The exposed surfaces of the teeth are closely invested, however, by a thin layer of osseous tissue continuous with that covering the surfaces of the depressions, and the inner alveolar border has not in reality been broken off. The teeth of this half-mandible are differently arranged as to size and position from those of the right half.

The row of teeth begins in front, as in the other half-mandible, with a small one; next to this comes the largest tusk, behind and internal to which is the largest depression, of a nearly circular outline; next come two small teeth with a very narrow depressed interval between them; and below the former of these it is that the alveolar border begins slightly to be deficient; then we have the second depression, followed by two teeth separated by a depression broader than the last: immediately behind the latter of these two teeth is a large and, as it were, double and deep depression one inch and a quarter broad; this is succeeded by three tusks separated from each other by two large depressions; after the last of these three tusks is a broad depression followed by a rather small tooth; lastly, behind this are two other teeth still smaller, with very short intervals between them; and the fractured end of the bone occurs directly after the latter of these teeth.

The teeth (Plate IV., figs. 2, 3, 4, 5, 6). With the exception of four on the right side of the cranium, three of which belong to the maxillary and one to the premaxillary, nearly half of the teeth of the right ramus, and one of the left half are broken off, as before stated. Their fracture is transverse, giving a circular outline, within which can be roughly seen their beautiful labyrinthodont structure. Several other specimens, however, of *Loxomma* have been found, of which the teeth are entire.

The size of the teeth varies both in the upper and the lower jaw, those of the vomerine plates and of the palate plates of the maxillaries being much larger than those of the alveolar borders of the maxillaries and premaxillaries; the second tooth of the left half of the lower jaw is much larger than any of the others of that part; the ninth, the seventh, and the eighth come next in order of size, and occupy a middle position in the ramus. In the right half, the second, eighth, and twelfth are the largest, differing but little in size from each other, and the sixth is next; the twelfth is in advance of the middle of the jaw. The teeth of the mandible are more deeply socketed than those of the maxilla; all are expanded at the bottom of the alveoli, and gradually become continuous with, and anchylosed to, the bone at that part.

Each tooth, for about one-fourth of its length above the border of the alveolus, is circular and of uniform diameter; in the upper three-fourths it is compressed on its inner and outer sides, so that its anterior and posterior edges become sharp and cutting, maintaining at the same time the width of the lower part of the tooth. It is longitudinally grooved all round on its outer surface for about one-third of its length from the alveolar border, and is abruptly pointed at the apex.

Some of the teeth are very slightly curved inwards towards the point. From the apex to within the border of the alveolus the tooth is clothed with a very thin layer of enamel, which appears structureless.

The internal structure of the teeth has been carefully drawn by Mr. Dinning in Plate IV., in which fig. 2 shows a perpendicular or longitudinal section, in a line with the jaw, of one of the posterior mandibular teeth, at the inner side of its centre, and carried through the contiguous parts of the thin band of bone mentioned as enclosing the lower part of the tooth. The longitudinal and slightly converging pillars or lines lying on each side of the pulp-cavity are the converging plates of dentine, the plicæ, seen in the transverse section, fig. 5. These plates or lines represent the labyrinthodont arrangement of the constituents of the tooth; and their upper terminations show the distance to which that peculiar structure extends; namely, somewhat less than two-thirds of the whole length of the tooth.

The anchylosis of the tooth to the jaw is also seen in fig. 2; the tooth-structures at the base are, every here and there, interlocked or dovetailed more or less deeply and curiously into the bone, in which they are gradually lost; but above the base the sides of the tooth keep distinct from the alveolus and are smooth.

Fig. 3, Plate IV., is a transverse section a little way below the apex; its outline is fusiform; and its extremities, one of which is rather more pointed than the other, are parts of the cutting-edges of the tooth; the dentine is enclosed by a thin plate of enamel, and encloses the small prolongation of the pulp-cavity.

Fig. 4 of the same plate is a transverse section near the top of the wider part of the pulp-cavity, and above the cessation of the radiating branches of the pulp-cavity; the arrangement of the dentine is still peculiar.

In Plate IV., fig. 5 represents a transverse section of a maxillary tooth (marked in Plate II., left side of figure, "*section*"), made a little below the borders of its alveolus, which are of equal height. In the centre is the somewhat oval pulp-cavity, which is pretty large as compared with that of *Labyrinthodon Jœgeri*, figured in Prof. Owen's "Palæontology;" from it pass off, radiating towards the periphery, numerous channels, separated from each other by the inwardly projecting plicæ or "infoldings" of the external layers of the tooth. The pulp-cavity and its radiations, being clear and colourless spaces, contrast well with the plicæ, which are brownish yellow, the osseous tissue around the tooth being of a lighter yellow.

The solid part of the tooth appears in the section to be arranged as a nearly circular series of toothlets or denticles, whose external margins or crowns, rounded but somewhat flattened, constitute the ridges seen on the outside of the tooth; they vary a good deal in size, and in one specimen number forty-one, in another forty-three. The concave internal margins, facing the centre of the tooth, correspond to and embrace the rounded, somewhat expanded ends of the radiations of the central pulp-cavity, each of which serves as the pulp-cavity of a toothlet, whose fangs are on each side of the space: each side of every toothlet is incorporated with that of its next neighbour; and these united are inflected towards the central pulp-cavity forming the plicæ, which divide the radiations of the pulp-cavity from each other; these plicæ are, of course, sections of the vertical plates shown at fig. 2 in Plate IV.

They vary much in length, the longest forming, by their inner ends, a series of more than twenty blunt projections, like radii of a circle, pointing to the centre of the pulp-cavity; the shortest are mere mammillary processes, enclosed between the bases of the longer ones; and there are others of intermediate different lengths. They pass in from the periphery at first, but for a short distance, straight, but soon form undulating and then zigzag curves, which continue to the end, where, in places, two or more may be seen united.

Each concavity on the undulating sides of the plicæ answers to a secondary offset of the pulp-cavity; and the dentine partially surrounding these little bays is disposed as a secondary toothlet, of which the bay is its particular pulp-cavity.

If now with the aid of a quarter-inch object glass (Powell and Lealand's) we look at the dilated end of one of the primary prolongations of the central pulp-cavity, which serves as a pulp-cavity to a toothlet, we see the tubules of the dentine radiating from its margin through a series of finely arched lines towards the crown and sides of the toothlet; before, however, reaching the outer borders of these, they pass into a dark granular-looking layer, which is parallel to the crown and sides, and in some toothlets double. This layer consists of black lines forming a close network, the meshes of which are minute and look like cells, giving this layer its black and granular aspect. It is usually well defined on its external side; but towards the pulp-cavity it is in many parts gradually thinned away, and continued, here and there, a good way into the tubular dentine; in such situations the lines often lose their dark colour, and resemble the tubes of dentine, with which it is not difficult to observe that they are continuous. The dentinal tubules can here and there be seen as black lines approaching the dark network; some can be observed to divide into two, as is common in human dentine. Many, perhaps all, of the dentinal tubes are thus, as it were, arrested in their straight course by the black layer.

Beyond this is a narrower and lighter-coloured tract, which forms the external boundary of the crown and sides of the toothlet; in it numerous closely set straight lines or tubules, mostly pale, but some black, and of the same size as those of the black layer, are visible, passing out of that layer to the exterior surface of the tooth. Thus the whole thickness of the crown of the toothlet is composed of tubular and granular dentine. The granular or nodular layer corresponds to that seen and often figured as commonly existing in the fang and other parts of the human tooth, and which is commonly black, but at times light-coloured.

In the tooth of *Loxomma* nothing like an external layer of cement is anywhere visible.

If we examine in any of our sections one of the grooves on the exterior of the tooth, we find it filled with a wedge-shaped portion of osseous tissue; but this does not pass beyond the bottom of the groove: the sides of the groove are formed by the adjacent borders of two toothlets; these approach each other at an acute angle, coalesce, and the resultant band passes inwards to the interior of a plica, being somewhat narrower than its constituents together before coalescence. The straight and short dentinal tubes, some pale, others black, are very distinctly seen on the margins of the groove.

The black granular layer of each of the two toothlets is bent inwards, and passes into the plica, one on each side of the now central band, which is of light colour, and forms, as it were, the core of the plica. At first, for a short distance, straight, the central band becomes wavy, and then, in most of the long plicæ, zigzag; and from each of the angles a straight process is given off laterally, and ends in a blunt point, which partially separates two secondary toothlets. The concavities of these undulations and zigzags correspond to the concavities of the borders of the plica, and therefore to the secondary pulp-cavities before mentioned.

The granular layer accompanies everywhere on each side the sinuosities of the central band and its processes, and holds the same relation to the tubular dentine of the secondary toothlets as it does to the same tissue of the toothlets of the exterior of the tooth; and it can anywhere be seen that the dentinal tubules have a similar course through that layer to the central band.

On scrutinizing closely the pale central band of a plica with a one-eighth-inch object-glass, the tubules of dentine are clearly seen at its margins; many of them end there, or perhaps are cut off, whilst others mostly, but not always or everywhere, colourless, are distinctly observed to cross over the pale band and unite with those of the other side, either as straight tubes, or forming with them a delicate and pale network, resembling that of the granular layer, but devoid of its colour.

V. The other bones of *Loxomma* that have been picked up are as follows:—eighteen separate centra of vertebræ, and twenty others imbedded more or less in slabs of shale in company with entire or fragmentary ribs; twenty-four ribs, of which a good many are nearly perfect, showing the head and tubercle; and seventeen bones of the extremities, one of which is a humerus, the rest digital, large and small. All these bones are well ossified, and their articular surfaces mostly perfect.

The centra of the vertebræ are commonly of considerable size, alternately larger and smaller, strongly compacted, and have the anterior and posterior surfaces concave, the former being less so than the latter; several show no facets for the heads of ribs.

The vertebral canal, where it can be seen, is small. The arches are therefore short, but strong, and unite above in a broad and high, but thin, spinous process; this is entire in only one specimen, but nearly perfect in two or three others; it stands up straight, inclining neither forward nor backward. All parts of the vertebræ are well ossified.

The following are the measurements of the vertebra, a dorsal, which is the most perfect, and is figured in Plate III., fig. 4:—Length of the body eleven-fifteenths of an inch, transverse diameter, one inch and five-sixteenths, vertical diameter, one inch and seven-sixteenths; height of neural arch, five-sixteenths of an inch, height of spinous process two inches, length of same from front to back, one inch and five-sixteenths, thickness, two-sixteenths of an inch. The body is grooved transversely, and has on each side of its upper and lower surfaces a more or less distinct half-facet for a half-head of a rib. The transverse processes are one inch in length, and have each a concave articular surface on the front of their extremities to receive the tubercle of a rib. The articular processes are sharply defined, their facets nearly circular and flat; the anterior pair face upwards and a little inwards, and the posterior downwards and a little outwards.

Of the ribs, the largest (see Plate IV., fig. 1) is seven inches and seven-eighths long, and the distance from head to tubercle one inch and three-sixteenths; the heads, necks, and tubercles of the ribs are strong and well defined, and there is a well marked groove on both surfaces running almost from end to end of the bones. The tubercle has an articular facet on its posterior face for the transverse process of a vertebra.

Out of the bones of the extremities it is not possible to construct a single paddle; there is only one humerus, no femur, nor are there any other bones of the anterior or posterior girdle.

The humerus is somewhat elongated, flattish, more convex on its outer than on its inner surface, broad below, narrow at the upper end; in length three inches and a half, in breadth at the upper end three-quarters of an inch, at the lower one inch and five-eighths.

At each end is a pair of articular facets; these are differently disposed. The facets at the upper end differ in size, one occupying the whole of the end, the other being placed at the inner margin of the posterior part of the former; both face upwards and inwards, the lesser one more inwards than the greater; those at the lower end look downwards and inwards, are more on the same plane than the upper pair, and measure respectively one inch and five-eighths of an inch in length.

As no epiphyses appear on any of these bones of *Loxomma*, the animal must have been adult, though of rather smaller size than some others the bones of which have been brought to light.

VI. Some of the relations that *Loxomma* bears to Fishes and Reptiles having been only incidentally mentioned in the course of this paper, we shall now endeavour to bring together such of them as at present occur to us, who are very far from being deeply versed in the intricacies of comparative anatomy; and in so doing we are bound to acknowledge with gratitude the indispensable assistance we have derived from the standard works of Professors Owen and Huxley.

Loxomma presents all the characters of the order Labyrinthodontia of Owen, except "two occipital condyles" for articulation with the atlas; and it has, besides, other characters which also show its affinity on the one hand with Fishes, and on the other with Batrachians and the higher Reptiles.

Its affinities with Fishes are evidenced by the presence of the following characters:—

By the existence of one concave articular surface, instead of a condyle or condyles, on the posterior face of the basioccipital bone, for articulation with the body of the first cervical vertebra. No atlas has been discovered; but it may be fairly presumed that the anterior face of its centrum was concave, since all the bodies of vertebræ of *Loxomma* that have been discovered are doubly concave, and the basioccipital itself is also concave behind.

By the existence of two facets on the exoccipitals for articulation with the neural arch of the atlas.

The former of these characters is almost altogether piscine; it occurs, however, only in *Rana* among Batrachians (Owen, "Palæontology," p. 208), and is therefore rarely reptilian. The second appears to be exclusively piscine; for Prof. Owen (Lect. on Comp. Anat., Vol. II., p. 91,) says that the "exoccipitals are immovably articulated in the cod below with the basioccipital, behind with the neurapophyses of the atlas," also that "in a few fishes (e. g. *Fistularia*) the exoccipitals send back articular processes modified to allow a slight movement upon the corresponding anterior articular surfaces of the neurapophyses of the atlas; but we find no such articulations as these, that we are aware of, in Reptiles. The ossification of the parts here concerned, however, is less perfect in Fishes than in *Loxomma*.

It seems certain that the mode of articulation of the head to the spinal column has been of such a nature as to allow of only a very limited amount of motion, that *Loxomma* had little facility in turning its head, and that its movements in this respect resembled rather those of Fishes than of Reptiles.

By the possession of dentigerous vomerine plates on the palate. *Lepidosteus* and the Batrachia have these; but we also see that "in some Alligators (*All. niger*) the divided vomer extends far forward, expands anteriorly, and appears upon the bony palate" (Owen, "Anat. of Vertebr.," Vol. I., pp. 138 and 146), though it has no teeth.

By the teeth being anchylosed to the bottom of their alveolus, the base of the tooth blending gradually into the bony structure around. This, however, is a reptilian as well as a piscine character. The same may be said of the inequality in height of the outer and inner alveolar borders of the mandible and, to a less degree, of the maxilla also. In *Loxomma* the inner border of the mandibular alveolus is very deficient, leaving the teeth as it were agglutinated to and supported by the external border only, which stands well up. This character exists in many Fishes; and in Owen's "Anatomy of Vertebrates," Vol. I., p. 388, we find, moreover, the following passage bearing on this character, and showing that it is found also in the Batrachia and the Lacertilia:—"In the Scincoids, the Safeguards (*Tejus*), in most Iguanians, in the Chameleons, and many Lacertian Reptiles the tooth is anchylosed by an oblique surface extending from the base more or less upon the outer side of the crown to an external alveolar plate of bone, the inner alveolar plate not being developed; in the frogs the teeth are similarly but less firmly attached to an external parapet of bone.

In structure the teeth are labyrinthodont.

On the other hand the skull of *Loxomma*, by its form and size, its strength and solidity of ossification, its peculiarly reticulated surface, and by the massiveness of its mandible, resembles much more the skull of the Crocodilia, and especially of the Alligator, than that of Batrachia or Fishes. The presence of limbs as paddles allies it with the orders of higher grade than Fishes.

The nasal bones are a pair; the nasal apertures being both anterior and pharyngeal show that *Loxomma* was an air-breather like the Crocodiles; and the existence of such ribs as that figured in Plate IV., fig. 1, confirms this view.

There is no anterior palatine foramen, neither are there posterior palatine or pterygo-maxillary vacuities as in the Crocodile and Alligator.

The doubtful perforation of the upper jaw in *Loxomma* is equally suggestive of the actual perforation of the corresponding part in *Lepidosteus*, and in the old Crocodile of the Nile, for the reception of a tooth of the mandible when the mouth is closed.

The apertures in each parietal bone, so large in the Crocodilia, are not present in *Loxomma;* but the "parietal" foramen, which exists, is a character common to it and the other Labyrinthodonts, to Ichthyopterygia, Sauropterygia, and Anomodontia, but does not belong to Fishes.

The temporal fossæ are, in *Loxomma* as in Crocodiles, Alligators, Tortoises, and Batrachia, placed on the sides of the top of the skull, and are not arched over by bony plates as in the Protopteri and Ganocephala.

The articulations of the mandible with the skull resemble the corresponding parts of the higher Reptiles rather than those of Fishes.

The large size and great importance of the superior maxillary bones as compared with the premaxillaries is a decided reptilian and not at all an ichthyic character.

The skull of *Loxomma* has two pairs of bones that are wanting in Fishes and in the Crocodilia, namely, the postorbital and the supratemporal; these contribute much to enhance both the length and the breadth of the cranium; they are present, however, in the Ganocephalous *Dendrerpeton* and *Archegosaurus*, in the Labyrinthodontia, and in the Ichthyopterygia; but the general ossification of the skull is much further advanced and consolidated in *Loxomma* than in these other animals, whilst in *Archegosaurus*, at least, it is very incomplete, having "been chiefly active at the surface" (Owen, Palæont., p. 195).

Besides the above two pairs of bones there is in *Loxomma*, as in *Archegosaurus*, another pair, to which attention was called above in the description of the bones, and which lies between the parietals in front and the occipital vertebra behind. This pair is called by Owen, Huxley, and Von Meyer "supraoccipital."

Now in *Loxomma*, at least, though not in *Archegosaurus*, on account of incomplete ossification, the occipital vertebra is formed by the basi- and ex-occipitals and a fourth piece of triangular form which is the keystone of the arch, and which in consequence we have called the true supraoccipital: the same arrangement exists in the skulls of Crocodiles and Alligators; and in these the occipital vertebra so constituted articulates above with the posterior borders of the parietals, and is more or less overhung by them; but in *Loxomma* the pair of bones abovementioned is interposed between the arches of the parietal and occipital vertebræ, projecting beyond and overhanging the occipital vertebra exactly as the parietal arch does in Crocodiles, etc.

Is this pair of bones properly designated supraoccipital, though it is actually so in position? Does it belong at all to the occipital or to the parietal vertebra, or is it a pair of dermal bones intercalated between the arches of these two? If it belong to the occipital, then there are three supraoccipitals; if to the parietal vertebra, then this must have had four pieces forming its arch. It seems most probable that it belongs to neither, but is a pair of independent pieces like the postorbitals (if these are not merely subdivisions of the postfrontals) and the supratemporals, and, like them, dermal ossifications, and let in, so to speak, between the regular vertebral arches. They cannot be the paroccipitals of Professor Owen.

That *Loxomma* had limbs, probably four, in the form of paddles, there can be little doubt; but they were probably not very large or strong; their digits were perhaps not more than four in number. The length of our *Loxomma* cannot even approximately be estimated, in the absence of caudal vertebræ.

The ribs are long and strong and of reptilian type, showing that the thorax was capacious, and that respiration must have been vigorously carried on by means of diaphragm and lungs.

As no scales or scutes have been found with the remains of *Loxomma*, the skin may have been soft; perhaps further researches may show that it had some defensive armour.

On the whole we may conclude that *Loxomma* was a rather sluggish reptile, capable, however, of vigorous movements, and predacious, inhabiting the waters, swimming mostly like a fish, but guided by its paddles, that it breathed air, however, like the Alligators and Crocodiles of modern time. It must find its place in the scale of animals somewhere between Fishes and Reptiles, between the Salamandroid fishes and the Crocodilia; for whilst it resembles most the Labyrinthodontia, it possesses characters, more or less important, in common with all the orders lying between Ganocephala and Crocodilia.

It clearly links together, in a very remarkable manner, the two great classes of Fishes and Reptiles, and adds fresh confirmation, if indeed such were needed, to the opinion of Professor Owen, that "other extinct orders, Ganocephala and Labyrinthodontia, have demonstrated the artificial nature of the distinctions between Fishes and Reptiles, and the close transitions that connect together all the cold-blooded vertebrates."

EXPLANATION OF THE PLATES.

PLATE I.

Upper surface of cranium of *Loxomma Allmanni*, half the natural size. *P. max*, premaxillary bone; *M.g*, mucus-grooves; *A.n.o*, anterior nasal orifices; *N*, nasal bones; *Max*, maxillary bone; *L*, lacrymal; *Ju*, jugal; *Qu.ju*, quadrate jugal; *Qu*, quadrate; *S.t*, supratemporal; *O.v*, orbital vacuities; *Fr*, frontal bone; *Pr.fr*, prefrontal; *Pt.fr*, postfrontal; *Pt.o*, postorbital; *P*, parietals, with parietal foramen; *Sq*, squamous; *S.o*?, supraoccipitals, so-called; *Mast*, mastoid; *T.f*, temporal fossa; *S.o*, supraoccipital; *Ex.o*, exoccipital.

PLATE II.

Under surface of cranium of *Loxomma*, half the natural size. *P.max*, premaxillary bone; *V.t*, vomerine tusks; *P.p.v*, palate-plates of vomers; *P.p.p*, palate-plates of palate-bones; *P.p.max*, palate-plates of maxillaries; *A.max*, alveolar border of maxillary; *Ap*, aperture in palate; *P.t*, palate-tusks; *Sect*, section of this tooth shown in Plate IV., fig. 5; *Ju*, jugal; *Qu*, quadrate; *Pter*, pterygoid; *R*, ridge on median line between palate and pterygoid bones; *Ec.pter*, ectopterygoid; *B.sph*, basisphenoid; *P.n.o*, posterior nasal orifices; *B.oc*, basioccipital; *Ar.cav*, articular cavity of ditto for atlas; *F.exoc*, facets of exoccipital for arches of atlas.

PLATE III.

Fig. 1. Posterior part of inferior surface of skull of *Loxomma*, a different specimen from that shown in Plates I. and II. Natural size. *R*, ridge on median line, fractured; *P.n.o*, posterior nasal orifice; *B.sph*, basisphenoid; *B.oc*, basioccipital; *Ar.cav*, situation of articular cavity, here broken away; *F.m*, foramen magnum, edge of; *F.exoc*, facets of exoccipitals; *Qu*, quadrate bone; *Mast*, mastoid bone; *Pter*, pterygoid bone.

Fig. 2. External surface of right half-mandible of *Loxomma*, supposed to be of the same specimen as is figured in Plates I. and II. Half natural size. The fractured part, the external end of the articular cavity, and the marginal groove along the lower border are well shown.

Fig. 3. Internal surface of fragment of left half-mandible, showing the symphysis, the difference of level between the alveolar borders, the teeth, and the interdental depressions. Half the natural size.

Fig. 4. Dorsal vertebra, natural size. *C*, centrum; *N.c*, neural canal; *S.p*, spinous process; *T.p*, transverse process; *A.z*, anterior zygomatic process; *P.z*, posterior zygomatic process.

PLATE IV.

Fig. 1. Rib, half the natural size.

Fig. 2. Longitudinal antero-posterior section through middle of a small tooth and its alveolar border, from right half-mandible, magnified four diameters. *A*, alveolus; *E*, enamel; *D*, dentine; *P*, pulp-cavity.

Fig. 3. Transverse section near apex of tooth, as indicated in fig. 2, sec. 3. Magnified 16 diameters. *E*, enamel; *D*, dentine; *P*, pulp-cavity.

Fig. 4. Transverse section just above the cessation of the plicæ, magnified 16 diameters. See fig. 2, sec. 4. *E*, enamel; *D*, dentine; *P*, pulp-cavity.

Fig. 5. Transverse section immediately below alveolar border, fig. 2, sec. 5. Magnified 16 diameters. *D*, dentine; *P*. pulp-cavity; *p*, radiations from pulp-cavity; *t*, toothlets; *B*, bone.

Fig. 6. Portion of fig. 5, to show minute structure. Magnified about 48 diameters. *B*, bone; *ex.l*, external layer of dentine; *gr.l*, granular layer; *D*, dentine, tubular; *pl*, plicæ, long and short; *ex.in*, external layer infolded; *gr.in*, granular layer infolded.

XIV.—*On the Articular Bone and supposed Vomerine Teeth of Ctenodus obliquus; and on Palæoniscus Hancocki, n. sp., from the Low Main, Newsham, Northumberland.* By Thos. Atthey. With Plate by William Dinning.

Ctenodus obliquus.

In a communication made by my late friend, Mr. Albany Hancock, and myself, to the "Annals and Magazine of Natural History," Ser. 4, Vol. VII., p. 190, we pointed out the close relationship that exists between the mandible of *Ctenodus* and that of the recent *Ceratodus*, and showed that the upper outer border of the dental plate of *Ctenodus* is unsupported. At the date of that communication the articular bone of *Ctenodus* had not been identified as such.

For a great many years I had occasionally obtained from the black shale overlying the Low-Main seam of coal at Newsham, near Blyth, Northumberland, an angular bone associated with the cranial bones of *Ctenodus*, but could not make out to what precise part of the head it might belong, until about three years ago, when Sir Philip Egerton kindly sent me for examination two palatal teeth and a mandible of the recent fish *Ceratodus Forsteri*, brought from Queensland, Australia. A glance at the specimens showed that the bone respecting which I was in doubt was the articular bone of *Ctenodus*, corresponding as it did in conformation to the articular bone of the recent *Ceratodus*.

Last year (1874) I was fortunate enough to find, also at Newsham, two fine specimens of *Ctenodus obliquus* with this very articular bone *in situ;* and one of these is figured on Plate V., figs. 1 and 2.

The bones differ in size, being from three-quarters of an inch to four inches in length. The inner side of the mandible is formed by the ramus or body of the jaw surmounted by the teeth; and these at their upper margins are turned outwards and flattened, and project towards the upper border of the articular or external piece. The narrow elongated space left between the two bones of the fossil at this part would necessarily in the fresh state be filled with connective cartilage and ligament, just as the corresponding space is in the recent *Ceratodus Forsteri*.

The articular bone of *Ctenodus* is of about the same length as the inner plate or ramus which bears the teeth, slightly convex on the outer surface, and marked by five or six apertures for vessels; it is pointed upwards in front like the prow of a boat. Its posterior border presents two scallops, the upper somewhat larger than the lower, which extends to the posteriorly projecting point of the lower border, which is convex; the upper scallop ends at a rounded projection, which separates it from the upper border. This border presents two shallow concavities, the anterior occupying the greater part of the border; the posterior has a projection on its inner side, somewhat in the form of a bracket, for the support of the teeth of the inner plate or ramus.

On a thin slab of shale from Newsham in my possession, and which measures five by three and a half inches, are seen imbedded one rib, several bones of the head, fragments of scales, and what I take to be right and left vomerine teeth of *Ctenodus*, one of which is figured on Plate V., fig. 4. The teeth are four-tenths of an inch broad, and thick at the base, their outer surfaces being slightly convex, and their inner slightly concave, the two surfaces converging from the base to the thin, convex, serrated or toothed margin, which is two-tenths of an inch long. The microscopic structure of these teeth corresponds exactly with that of the maxillary teeth of *Ctenodus*.

I possess about a dozen other specimens believed to be vomerine teeth of *Ctenodus*, in close proximity on the same slabs to the bones of the head and teeth of *Ctenodus;* some of these are a little larger, others a little smaller, than the two above described.

Palæoniscus Hancocki, *n. sp.*

This elegant little fossil fish I have ventured to name after my late, lamented friend, Mr. Albany Hancock.

It measures from two inches and a half to three inches and a half in length, and its depth immediately behind the pectoral fin is four-tenths of an inch; this is maintained as far as the ventral fin, beyond which it diminishes towards the tail: the body is therefore long and slender. The fins are small; the articulations of each of the rays of the pectoral are very distant, those of the ventral, anal, and dorsal are less so; the rays of the ventral, anal, and dorsal are more slender than those of the pectoral. So far as can be made out, the tail is delicate, the upper lobe somewhat longer than the lower. There are two conspicuous rows of scales on the side of the ventral part of the body near the margin: these scales are twice as high as they are wide; their external surface is smooth, and their posterior margin finely serrated. The other scales are only about half the size of the above mentioned, and of rhomboidal form. The head, in length, is about the sixth part of the body. The teeth are very minute, and of two sizes, larger and smaller, sharp-pointed, and set closely in the jaw. The mouth is large; the maxillæ and mandibles, and the bones of the upper surface of the skull, are covered externally with a delicately sculptured and shining pattern of convoluted ridges and grooves, the former of which are flattened. The operculum is large and smooth, the suboperculum less. Eight branchiostegal rays exist, and project beyond the line of the mandible, the one next to the pectoral fin being by far the largest. The lower border of the mandible is furnished with a row of projecting points, continuations of the ridges on the side of the mandible.

The above characters so clearly separate *P. Hancocki* from other *Palæonisci* that I am in doubt whether or not it should be ranked as a member of the genus; but I have given the name *Palæoniscus* to it provisionally, in order to bring the fossil to the notice of palæontologists. It is from the Northumberland Coal Measures, and has been found in the black-shale of the Low Main at Newsham, Cramlington, and Kenton.

Note.—I take the present opportunity of correcting two errors into which Mr. Miall appears to have unconsciously fallen. First, in his paper in the Journal of the Geological Society for December, 1874, he says:—"A restoration of the palate of

Ctenodus cristatus forms one of the illustrations of Messrs. Hancock and Atthey's series of papers on the Fishes and Labyrinthodonts of the Northumberland Coal-field." Now the illustration here referred to is not a restoration of the palate of *C. cristatus*, Agassiz, but of that of *C. tuberculatus*, nobis. Secondly, he states that we describe the upper surface of the tooth of *C. cristatus* as convex, whereas in reality we state that it is "somewhat hollowed or concave." Our paper noticed by Mr. Miall was published in the Nat. Hist. Trans. of Northumberland and Durham, Vol. III., p. 61, the illustration referred to in Vol. IV., Pl. XIV.

EXPLANATION OF PLATE V.

Fig. 1. Outside view of right mandible of *Ctenodus obliquus*, nat. size.

Fig. 2. Right mandible, seen from above: *a*, articular piece; *d*, dental plate; *s*, symphysis of jaw.

Fig. 3. Left pterygo-palatine bone, with dental plate attached, of *Ctenodus obliquus*, nat. size: *a*, anterior end; *pt*, pterygoid border; *p*, palatine border; *s*, symphysis; *sp*, rough surface for articulation with the sphenoid bone.

Fig. 4. Vomerine tooth of *Ctenodus*, nat. size: *a*, front, *b*, side, *c*, back view.

ADDRESS TO THE MEMBERS OF THE TYNESIDE NATURALISTS' FIELD CLUB,

READ BY THE PRESIDENT, THE REV. G. ROME HALL, F.S.A., AT THE THIRTIETH ANNIVERSARY MEETING, HELD IN THE MUSEUM OF THE NATURAL HISTORY SOCIETY, NEWCASTLE-UPON-TYNE, ON TUESDAY, APRIL 11TH, 1876.

GENTLEMEN,—On the 25th of April, 1846, the TYNESIDE NATURALISTS' FIELD CLUB was established, and it has for nearly a generation past served the cause of science with considerable and often-acknowledged success. As my immediate predecessor, Mr. Carr-Ellison, to whose initiative its formation was so greatly owing, was its first President, I may be permitted to remind you of this, before thanking you, as I now desire to do, for the honour which you very unexpectedly conferred upon me in electing me his successor. When I considered the scientific eminence of so many of those who have previously occupied this position, and that my own line of research has gone out rather into the historical and the antiquarian, I felt much diffidence in accepting it. I also feared that from living at a distance I should be unable to serve as I would desire the interests of the Society, by attending all its Field and other meetings. Your courtesy, however, overlooked these drawbacks; and I was glad to find, on referring to our primary rules, that Natural History and Antiquities were conjoined in the original intention; that a special saving clause existed to this effect, that "the Antiquarians of the district be invited to unite with the Club for the promotion of their pursuits."

By a coincidence fortunate at least for myself, the places fixed upon for the various Field Meetings of the past season have been distinguished quite as much for their historic and archæological interest as for their special attractions to the votaries of natural science. Nor, inasmuch as scenic beauty had also a voice in their selection, have our meetings been less favoured than usual by a large attendance of members. The anniversary address being expected to afford a retrospect of these Field excursions, especially, I may now proceed to give my notes upon them—

premising that during the past year they have been limited to five, instead of six. In this respect we have reverted to the earlier practice of the Club, the final meeting at Marsden or St. Mary's Island having been omitted. For information connected with the meetings held at Ebchester and Holy Island, which from unavoidable circumstances I was unable to attend, I am chiefly indebted to our esteemed and obliging Secretary, Mr. Thomas Thompson.

The First Field Meeting of the Season was held on the 25th of May, at South Shields. The weather was all that could be desired, fine, warm, and genial; the day in its vernal beauty resembling those of which our older poets have sung, when "winter lingering chills" not "the lap of May." Thus favoured in our inaugural excursion to an easily accessible centre, the members assembled to the number of about an hundred, many ladies also honouring us with their presence during the afternoon. On our arrival at the High Shields Station the Rev. Dr. Hooppell met and conducted us first to the site of the underground fire, Harrison's Court, between West Holborn and the Commercial Road. Standing here in the midst of smoking ruins and dismantled houses, the scene resembled part of some beleagured town in the late Franco-German war after a recent bombardment, rather than the heart of a peaceful English sea-port. Thin jets of malodorous vapour were issuing from fissures in the cindery banks up which we laboriously climbed to the place where the destructive subterranean fire is said to have originated. The first indication seems to have shown itself in February, 1872, at a spot pointed out near a foundry. If not arising from spontaneous combustion in the very inflammable materials of these rubbish heaps, a dormant fire smouldering in the refuse from the ancient salt-pans for which South Shields has been famous from, at least, the year 1489, down to the beginning of this century, it may have originated in "a strong fire applied externally to the heap." As we passed through a narrow lane from Carpenter's Hill we saw a practical proof of its alarming character. Besides the twenty houses already destroyed others were in jeopardy; and we were asked by an inmate of one of the threatened dwellings to enter a room which she had occupied until then. Having become quite uninhabitable, as she said, "by any human being," the few articles of furniture had just been removed to the door. The "stythe" came from the ceiling and the wall built against the bank, and with the great heat was certainly beyond endurance. We noticed that the Corporation were making an effort, at considerable outlay, to prevent the extension of the fire by deep trenching the area included in its ravages, several men being then employed in the work, which all will unite in hoping may prove eventually successful. I was sorry to hear, however, that in October last a large dwelling-house was destroyed, and that so suddenly, that the family residing in it scarcely had time to make their escape. Very recently also there seems to have been another outburst, which has been checked. As the cause and progress of this extraordinary underground fire has caused much more than a local interest, it is a great advantage that one of our members, Mr. George Lyall, has contributed a carefully-prepared paper on the subject to the Transactions.

Through the busy streets, past St. Hilda's Church, and the Market-Place of the town, we now proceeded to the handsome Nautical College or Marine School, founded by the late Dr. Winterbottom, over which our guide, Dr. Hooppell, had worthily presided for many years. Here we examined with much interest the collection of Roman and Romano-British antiquities arranged in the various apartments, and also in the garden, for facility of inspection, which have since found an appropriate and permanent home, I trust, in the Museum of the Free Library. These were graphically explained to the members in the Lecture-room afterwards by Dr. Hooppell, and Dr. Bruce gave us the full benefit of his unrivalled knowledge of the Roman Age in Britain, both here and at the "Lawe," which was next visited.

On this great mass of boulder-clay, near the mouth of the Tyne, a strong and important, but as yet nameless, Roman Station had been placed. Probably, to judge from the massive clamped masonry of the *ærarium* or treasure-chamber, similar to that of the Roman bridge at Chester, with its stone-lined cavity for the money-chest of the legionaries, it was of as early a date as the days of the Emperor Hadrian, the builder of the Roman Wall. This castrum would serve to guard the mouth and right bank of the Tyne.

The Exploration Committee, aided by an enthusiastic band of voluntary helpers, the pilots of the Tyne and others, have disclosed rampart-walls and streets, public and private buildings, a forum or market place resembling on a smaller scale those at Cilurnum (Chesters) and Pompeii, the remarkable strong chamber below the level with steps leading down to it, and on the right a window-sill still *in situ*, which is perfectly unique, with various associated remains of great interest and novelty. In this recently-discovered Roman town, our genial guide, to whom the superintendence of the excavations had evidently been a labour of love, showed us where the different treasures under his charge had been found. There were, as we had seen, Roman roof-tiles, Samian and Caister ware, pottery from the smother-kiln, *amphoræ*, or wine jars, and querns for preparing corn, after the manner of the "two women grinding at the mill," such as is used in Palestine and the East even now, bronze fibulæ and brooches with "safety-pins," several coins of gold, silver, and brass, of various dates, three having on them the Christian or Constantinian emblem, as Dean Stanley has now acknowledged in the note to his splendid lecture on "The Early Christianity of Northumbria,"* in which he had said at Sunderland that "amongst the numerous remains of the Roman Wall not one Christian vestige had been found." Among other objects were the keystone of an arch, with a boar's head sculptured in relief, the mystic pine-cone, here in its stone socket, not hitherto discovered, I believe, with it, the emblem of fire and of the vital flame to the ancient Assyrian and Palmyrene as well as to the Roman, and the mural monument with the imperfect inscription from which, compared with another on a tile, some consider that the garrison of this strong station, *Ad Tinam*, was the fifth Cohort of the Gauls. I was personally interested in two relics that seemed to imply a pre-historic occupation of the same site, a

* "Good Words," 1875, p. 246.

small slab with the puzzling cup-incision, very similar in appearance to one which I had found in an ancient British hut-circle near Birtley, and to two others discovered near Cambo, of which one was within a large tumulus, on which an urn had been inverted, containing the remains of a little child. The cup-incision is the simplest form of those mysterious rock-markings first found in the north of Northumberland, and since discovered on rocks, and so-called Druidical stones, from Argyleshire to Cornwall. The other was the curious grooved implement of sandstone, like a ship's block, the use of which is unknown. Similar grooved and notched stone blocks have been found in connection with Picts' houses in Orkney, in Caithness, in Ireland, Scandinavia, and the lake-dwellings of Italy.* Some consider that they were employed as sinkers for fishing, as they have usually been found near the sea or inland lakes. But this conjecture of the Scandinavian antiquaries is set aside by others, in favour of their use, when attached to a thong and swung round, as a weapon like the flail-stone mentioned in the early annals of Ireland. Yet, it is equally probable that they have been employed as sharpening stones for weapons and implements. One or two specimens may be seen in the Museum of the Society of Antiquaries of Scotland, in Edinburgh. Among the osseous relics were apparently some skulls and remains of native British oxen, *Bos longifrons*, the small dark-coloured breed of shorthorns, ancestors of the Welsh and Highland cattle, not of the famous herds of Chillingham Park, Hamilton Palace, and Chartley Park, in Staffordshire, as is commonly supposed; the latter are the larger, light-coloured *urus* type, introduced by the Saxons in the fifth century.† Portions of red-deer horns, tusks of wild-boar, teeth of small British horses that once drew the Roman *bigæ* or Celtic *Essedæ*‡ had been disinterred; and also, more noticeable and of deeper interest than these, parts of three or four different human skeletons, Roman or Celt, who had fallen, perhaps, in some sudden

* "Proc. Soc. Antiq. Scot.," Vol. VII., p. 50 and 75. "Evan's Ancient Stone Implements of Great Britain," p. 194 and 229.

† "Cave Hunting," by Professor Boyd-Dawkins, Chap. III., p. 88.

‡ A portion of the bronze buckle of the horse-trappings of a late British Chariot was discovered in the chief circular dwelling of the Carry House Camp, near Birtley.

onslaught of Pictish or other foes, and lay buried beneath the ruins of the desolated forum and the adjoining chamber. A more complete exploration of this ancient town is very desirable, and the cost being but small, compared with the wealth of the inhabitants, we may hope that the local Museum will shortly be enriched by other valuable discoveries, that will clear up much that is at present difficult to understand in the singular transformations and alterations of the buildings, and the successive occupations of this interesting Station. To judge from the recent discovery of late British burial-cists, and other indications, it was inhabited, like the Settle Caves in Yorkshire, down at least to the troublous times that followed the departure of the Roman legions from Britain, A.D. 411.

The party, now not quite so numerous on account of many members having to take an early train, retraced their steps, and partook of an excellent and substantial tea, provided by Mr. Weir, at the Golden Lion Hotel. Fourteen new members were duly proposed and elected, and Mr. Lyall's "Memoir on the Underground Fire" was read by the President; and Dr. Hooppell laid us under yet further obligations by giving a lucid *résumé* of the results of the recent explorations at the Roman town at the "Lawe," an account of which, up to the present time, will be furnished by him for the Transactions; after which Dr. Bruce favoured us with some interesting criticisms and observations. The salt manufacture of former days was also discussed, and Mr. R. Y. Green showed two warrants of George II. and III., constituting his great-grandfather collector of the salt dues at South Shields.*

I am not aware whether any member embraced the opportunity of botanising on the Ballast Hills, a singular attraction to a town excursion, where so many curious plants have sprung up from seed brought with the foreign ballast from the East and South of Europe, India, and other lands, which are unknown elsewhere in this country. These exotics have been carefully recorded in our "New Flora of Northumberland and

* "Beauties of England and Wales," Vol. V., 155,ff., describes the Roman Station and Salt-works in 1803.

Durham;"* such as *Lavatera trimestris, Vicia Benghalensis, Melilotus Messanensis, Lepidium sativum, Tordylium Syriacum, Œnothera biennis, Claytonia perfoliata*, etc., etc.

Our first meeting was one of more than usual interest, and left very agreeable memories behind it.

The SECOND FIELD MEETING was at Ebchester and Chopwell Woods, in the beautiful vale of the Derwent, on Friday, 13th June. About sixty members were present, arriving by the Consett Branch Railway, a little after one o'clock. I was unfortunately compelled to forego the pleasure of joining the party, which I the more regretted as the district would have been new to me, and I had not seen the ancient Roman Station of *Vindomora.* Dr. Bruce, being guide, and in his special element, everything interesting and noteworthy was sure to be well explained and illustrated. The outline of the Camp, I understand, is still visible, enclosing an area of about four acres, forming a square, each side of which is about 160 paces, the north rampart being placed on the summit of a bold escarpment above the river. The great Roman road, the Watling Street, passes on the western side, leading from Corbridge, *Corstopitum,* on the Tyne, ten miles to the north-west, to Lanchester, *Longovicum,* six miles and a half further south, the two nearest Roman stations. Within the ancient town itself, near the south-west corner, stands the Christian church and churchyard, built, no doubt, as Surtees says of that of Lanchester, of "Pagan masonry," like the other buildings which obscure the site. Several inscribed altars and mural monuments, taken hence, have found a resting-place chiefly in the library of the Dean and Chapter at Durham, but also at Minsteracres and Ushaw College.† A few lettered stones would be noticed, one over the door of a beer-house, with a very indistinct inscription, a small altar built into an outhouse attached to the vicarage dedicated to Mars and the deity of "our Augustus;" another, recently discovered in enlarging the churchyard, to *Vitires*, or, the

* Vol. II. New Series, p. 303.

† See Dr. Bruce's "Lapidarium Septentrionale," p. 351, etc.

"ancient god," answering, as many think, to the plural form found elsewhere, "*Dibus Viteribus*"—to the ancient gods. This may probably be taken as a proof of the contest between the new Christian and the ancient Pagan religion and their adherents during the second and third centuries, and perhaps still later. Coccidius, a local and tutelary deity of the native Britons, if Vitires was not also one, seems to have had religious honour paid to him by the Roman legionaries of Vindomora; moved, as they were elsewhere in Northern England, either by feelings of fear after some check to their arms, or by the same spirit of veneration which prompted the men of Athens to propitiate even the "unknown God."*

The very name of Ebchester, the *castra* of the royal Saxon lady, Saint *Ebba*, is significant of the downfall of Celtic and Saxon Paganism and of the eventual triumph of the true faith in ancient Northumbria. Since the Constantinian coins, whereon may be seen the Christian emblems, were struck and then passed current in Roman or British hands in the ancient town on South Shields "Lawe," generations had lived and died. A new race, heathen worshippers of Wodin and Thor, had landed with King Ida at Bamborough, in the sixth century, fierce, powerful, and numerous enough to drive the Romanized Celt before them into the western mountains, or subject them to their sway. But even these at length submitted to the victorious might of the Cross. Not long after the great triumph of King Oswald, at Heavenfield, over the pagan British King, Caedwalla,† on the height overlooking the North Tyne, near Chollerford, where St. Oswald's Chapel stands (within sight as I write these words) as an enduring memento of that conclusive victory, his sister, the Princess Ebba, probably established her monastery at Ebchester, between the years 634 and 642. The two kingdoms of Bernicia, between the Tees and the Forth, and Deira, between the Tees and the Humber, were then consolidated under Oswald's rule. What his predecessor, Oswine, had attempted to do by the help of the Roman Missionary, Paulinus, with a

* Acts xvii., 23.

† Bede; Eccles. Hist. (Bohn's Trans.) B. III., c. 2, p. 110.

success more apparent than real, he now strove to accomplish by the aid of the holy Aidan, whom he had brought from Iona, where he himself had found refuge and Christian instruction in his youth, during the reign of his cousin, Ædwine. Few pictures in old English history are so striking as that of the good Scottish bishop, accompanied by the great Saxon Bretwalda, his royal friend and interpreter, journeying throughout the wide extent of ancient Northumbria in long mission journeys. It is a subject on which our Northumbrian painters might find fitting scope for their genius. Probably Ebchester was among the places visited and evangelised; and where, perhaps, some earlier church, or *basilica*, had stood within the ruined ramparts of Vindomora, the pious brother and sister would cause to arise a new Christian sanctuary, built chiefly of Roman stones, like the present church, "land and money," as Bede tells us, "being provided by the King's bounty." The monastery on the banks of the Derwent would in that dark age prove a centre of light and civilization, till it was extinguished for a time by the terrible Danish invasion. Ebba is still better known by her connection with Coldingham, north of the Tweed, where St. Cuthbert visited her new religious establishment, built like her native Bamborough on the grand cliffs of the rock-girt headland which still bears her name, St. Abb's Head. At Ebba's Nook, also, was a chapel, not far from Holy Island. It is said that a piece of cloth presented by Ebba was so regarded by St. Cuthbert that it was preserved, and used, like the sheet presented to him by Virca, abbess of Tynemouth, as one of those in which his body was swathed. Seven centuries after his death we find among the precious relics at Durham "a particle of the cloth which St. Ebba gave to St. Cuthbert, in which he lay for 418 years and five months."* The tradition of the Scottish Church is that she received the veil from Finan, and was buried in her own monastery of Coldingham, in whose deeds St. Ebba is associated with St. Cuthbert and St. Mary, so high was the honour, after death, of her who has given to Ebchester its name.

* Raine's "St. Cuthbert," p. 123.

Memories such as these that form historic links between Romano-Celtic, Saxon, and even Danish times, for the Danes destroyed here as well as elsewhere the Christian sanctuary; besides, the intrinsic interest of the place and the picturesque scenery around it, would make the old Roman Station, and especially the Church of Ebba's-Chester, well worthy of inspection. On leaving it, the party proceeded through the Chopwell Woods, which are well-known to Mr. Thompson, who now acted as guide, by crossing Derwent Bridge, and passing by Broad Oak and Milkwell Burn, where the botanists and entomologists obtained rich harvests. The route led down to Rowland's Gill, where tea was provided by Mr. Smith, of the Towneley Arms Inn. After tea, seven new members were elected. The weather was again fortunately very fine, and the excursion very enjoyable.

The Third Field Meeting was held on Friday, July 9th, in North Tynedale, near Wark. Notwithstanding that the weather was on this occasion a decided contrast to that which we had so far experienced in our previous field-days, showers falling without intermission the whole afternoon, nearly one hundred members with their friends, including many ladies, were present. On arrival at Wark Station, about half-past one o'clock, it was decided that the river-bank and fine woods of Chipchase could not be explored, and we, therefore, proceeded at once to the Castle. Under the secure and agreeable shelter of Mr. Taylor's hospitable roof we were most kindly received and entertained, as the members also were, in 1867, on their excursion to the Barrasford Crags and Birtley. The numerous party were shown over the unique Pele-Tower, which is as large as the donjons of many Norman Castles, and they also examined the various objects of interest, antique and modern carved work, paintings by Millais, the Richardsons, and other masters, which render the fine Jacobean manor-house, attached to the great Tower, doubly attractive. Mr. Thompson moved a vote of thanks, which was seconded by Mr. H. Knight, one of the committee of the Belfast Naturalists' Field Club, for the kindness shown by Mr. Taylor; who, in reply, said he would be very glad to entertain his fellow-members of the Tyneside Club, whenever they visited his locality.

A brief delusive interval of fair weather enabled the party next to attempt to carry out their programme by proceeding to Wark, once the important metropolis, so to speak, of the royal franchise of Tynedale, and still the chief place of the ancient Barony of the same name. In spite of pitiless showers which again assailed us a goodly company of members, and a few ladies also, assembled on the historic Mote Hill, when its story, the surrounding antiquities, and objects of interest, were briefly described by the President. The town is said to have once been a "city," as the field above Battle-steads, called the "city-deals," (from the Saxon *dœl*, a part or share, and *dælan*, to divide or portion out, cognate with the German *theilen*, Sanskrit *dala*, and *dal*, to split; referring to the ancient division of common lands), still appears to witness. Tradition tells that the streets and buildings extended as far as Huxty Burn, and that the ancient church of "St. Michael of Werk," of which the ruined arches of an aisle still remained on the "Kirk-field" within memory, stood in its midst. Our late lamented colleague, Dr. Charlton, ten years before read, on the summit of this great earth-work, as some of us well remember, a very graphic account of the Assize-Courts held upon it by the Judges Itinerant of the Scottish king Alexander III., and of the English King Edward I., in the thirteenth century.* Local legend asserts that this Mote-Hill, or Hill of Assembly, is in its present form partly artificial; that even women and children were compelled to contribute their quota of labour and carry "lap fuls" of soil to the top. The early British vale-dwellers would find it a strong place of defence, guarding the chief ford across the river. The Romans occupied it, as a Roman altar now in the Old Castle of Newcastle-upon-Tyne found here, testifies. Traces are yet visible, on both sides of the North Tyne, of one of their cross-roads between the great towns on the Wall and Watling Street, which is supposed to pass through this ford. The name of the

* "On the Sessions of the Liberty of Tynedale," Vol. I., New Series, p. 168.

town itself, which sprang up around its base, is witness to the importance of the Mote-Hill in the eyes of the Saxon and Danish settlers in the valley. To them it was "THE WORK," *par excellence*, of the whole district, the word being still so pronounced in the native dialect, (as a "day's-wark," etc., compare Norse, *virki, a mound, an entrenchment;* Danish *värge, to defend,* and *wark,* Eng. work, Naworth=Newark); and it appears in the local nomenclature elsewhere as in the famous castles of Warkworth, Wark on the Tweed, and Newark on the Trent. This name corroborates the tradition of its partially artificial character and origin, implying that even in these days it was considered to be a "work" of hoary antiquity. On the opposite side of North Tyne, in a ploughed field near Warkshaugh, is a remarkable family barrow of pre-historic times, the examination of which is described in the "Transactions" immediately preceding Dr. Charlton's memoir, which I have now thought it well to supplement by these further notices connected with the ancient town of Wark, as perhaps being of some interest to our members, who have now twice visited it.*

From the Mote-Hill was pointed out the route which we had proposed to take, if the elements had not still continued to fight against us. It lay along the pleasant bank of the river, near the picturesque grounds and mansion of Blindburn, the seat of Major-General Allgood, C.B., and past the haunts of the *Dipper*, *Kingfisher*, and *Grebe*, and the Cinder Kiln Hills, or immense heaps of iron scoriae, of unknown antiquity, near Birtley Wood. The adjoining Carry House Camp, where explorations in the ancient British Circular Dwellings have disclosed relics of Celtic, Roman, and Saxon occupation, would have been next visited, and the well-defined Terraced Slopes on the hill above it for early cereal cultivation,† beyond which the Countess Park Woods, and the precipitous "Clint Rocks" overhanging the river, with the

* A field a little to the north of the modern church of Wark is called the "Kirk-doors," in a document recording the division of the ancient town-field in 1715, as the Rev. John Thompson informs me. Low Park End, Parkside, and the "Through-Gates, all seem to refer to the former "royal park" of Wark and its boundaries on the south.

† An Enquiry into the origin of certain Terraced Slopes in North Tynedale, Nat. Hist. Trans., Vol. III., p. 32. Compare Archæologia Æliana, New Series, p. 8.

shadowed depths of the beautiful fern-fringed ravines, would have formed an excellent terminus of the excursion. This being certainly one of the most lovely spots in the county, as my friend Mr. John Hancock will bear me witness, it has been proposed some time since as a suitable place for an autumnal Field Meeting, and could be best reached from Reedsmouth Station, walking thence on some future occasion when, we may hope, the weather will prove more propitious, to Wark Station, following the windings of the river banks.

Before leaving the historic Mote-Hill, which is a mass of gravel, apparently cut into its present shape by the action of water, Mr. Hugh Miller, F.G.S., of H.M.'s Geological Survey, was good enough to point out to us two of the natural curiosities of the neighbourhood, which he had observed in the Warksburn, which enters the North Tyne about a hundred yards to the south. One is an interesting section displaying old *Sigillaria* stems in an upright position above coal a short distance above the bridge, the only example of the kind met with in the district around Wark, although even better examples are probably known to many of the members as occuring elsewhere in the Carboniferous strata of Northumberland and Durham. About half a mile above the bridge the other may be noticed. It is a curious "*petrified cascade*." A deposit of calcareous matter, from the hard water dripping over a fall some fifteen feet high, has solidified in the form of a nearly vertical rush of water, much in the same way as a spar pillar is formed inside a cave. Mr. Miller mentions, that he has not before seen anything like it, and it, no doubt, deserves to be considered one of the "wonders of Wark" by the numerous summer visitors, who are attracted by the beauty of the scenery and the salubrious air to the long-sequestered valley of the North Tyne. I may add that he intends to favour our Society this year with a memoir on the special geological features of this district, which I need not say will be welcomed by us all as coming from so competent an observer.

Having lingered quite long enough, however, on this elevated "coigne of vantage," particularly when the relentless showers continued to fall, and prevented even the geologists from diverging into Wark's burn, we found a convenient refuge in the commodious and handsome Town-hall of Wark, lately erected at Mr. Taylor's cost, and fitted also for the purpose of a Mechanics' Institute and Library. After resting here, when some prehistoric spear-heads and axes of bronze were shown, found very recently in the Chipchase Park House quarry, from which was obtained the stone for building the Town-hall itself, we returned to the Station Inn. A few of the braver spirits of the party nearly fulfilled the programme, and, being carefully directed, reached the ancient British camp. The large majority were well content to find themselvess shortly afterwards partaking of the excellent tea provided by Mr. Porter, of the Chipchase Arms Inn, who made every exertion for the comfort of his numerous guests. Ten new members were elected; after which Dr. Bruce was induced to give us some reminiscences connected with the ancient Court Leet and Court Baron of Wark, which he had attended for many years, now a thing of the past, like other peculiar customs and social usages of the Anglo-Scottish Borders. These he culled for our pleasure, who were willing listeners, from his abundant stores of antiquarian and legendary lore. A brief memoir "On the History and Architecture of Chipchase Castle" having been read by the President, which will appear in the "Transactions," the members left Wark by the 8·15 p.m. train for Newcastle, after, I trust, a not unpleasing or unprofitable afternoon's excursion, despite the unfavourable weather.

The FOURTH FIELD MEETING took place at Holy Island, on Monday, August 2nd, when about thirty members were present, but the exigencies of home-duties, unfortunately, with the distance to be travelled on a Monday morning, when unaccommodating railway junctions intervene, prevented me having the pleasure of joining the party.

The Central Station was left about six o'clock for Belford, where breakfast, acceptable no doubt after so early a journey, was prepared at the Blue Bell Inn. Through the kindness of the Rev. William Atkinson Clark, his residence, Belford Hall and the surrounding grounds, were shown to the members. They had the pleasure of inspecting the valuable ornithological museum, and the rare collection of ferns, amongst which was the "*Asplenium septentrionale,*" from Kyloe Crags, near Berwick, found by Mr. Clark. The first mention of the town of Belford (*Beleford*) is by Jordan Fantosme in his History of the Civil War, in 19 and 20 Henry I., when it was sacked by the Scots. From the Pipe Roll of this and the following year, Lowick was the capital of the Barony de Musco Campo. King Henry I. had enfeoffed Robert de Muschampe of this and twenty-four other manors *in capite.* In King John's reign, Wooler was the capital manor, as appears by an inquisition in the Testa de Nevil.* It passed, after this, into the possession of the de Grahams. So recently as the year 1722 (23rd May), David Graham, eldest son of the Duke of Montrose, was made Earl and Baron Graham of Belford, from the old asssociation and connection with this manor through his remote ancestor Nicholas de Graham, who married Margery de Muschamp, and proved his title in 1293, before the King's Justices Itinerant. The Conyers, Armorers, Forsters of Bamborough (in the 17th century), Dixons, and Lord Onslow, were all successive possessors, till it came, by purchase, to the predecessors of the present Lord of the Manor, Mr. Clark.

Conducted by the obliging agent of Belford Hall, the party next proceeded, by a walk of about five miles, to the Beacon, where cobles were in waiting to convey them to Holy Island. Having visited the "Lough," where some fine specimens of birds were obtained by Mr. Thompson, our Secretary, the remains of the Castle were inspected, and the splendid views from the Castle hill admired. Then the stately ruins were examined of the world-famous Abbey and Monastery of the 11th century, standing on the site, probably, of the holy Aidan's humble Cathedral Church of Lindisfarne, built, "*more Scotorum,*" like our ancient British circular dwellings, of split oak, and thatched with coarse grass or wiry bent, which Bishop Eadbert, soon after the sainted Cuthbert's death, removed, in order to cover the roof with lead. Holy Island, and Bamborough Castle opposite,

* Hodgson's History of Northumberland, Part III., vol. I., p. 231.

may well remind us of the true source of early Northumbrian civilization and Christianity in the Scottish Bishop Aidan and King Oswald, his interpreter's, noble, self-sacrificing efforts in their missionary journeys for their people's welfare.* Who does not recall the former glories of Lindisfarne, and the strange fortunes, alive and dead, of the Patron Saint of Northern England, on which our best writers, from the "Venerable" Monk of Jarrow to Sir Walter Scott and Dean Stanley, have loved to dwell, until they are now in all English-speaking lands, "familiar in our mouths as household words ?"

After dinner four gentlemen were elected members, and the party then returned to Belford Station, reaching Newcastle about ten o'clock, having spent a long and very pleasant day.

The Fifth and last Field Meeting of the season was held, according to a recent custom of the Club, outside our two Northern Counties, on Wednesday and Thursday, September 8th and 9th, at Roseberry Topping, in Cleveland. Though we were not a numerous party, only eleven members with one lady, who proved to be an excellent pedestrian, yet we were more in number than those who visited Whitby on a former occasion. We had also the satifaction of a pleasant sociability, in which a larger party must be necessarily deficient. Leaving the Central Station at half-past eight o'clock, we reached Stokesley, by way of Stockton and Preston Junction, about eleven; when, under the guidance of Mr. Markham Tweddell, the local historian and poet, we started on our excursion, passing the parish church, a modern structure, and then through a pleasant field-path towards Roseberry. In ascending, we were unable, on account of recent heavy thunder showers, to examine a picturesque and promising ravine, which would no doubt have afforded interesting specimens of the flora of the district, described by Mr. J. G. Baker. At the head of the dene is a farm-house, called Harry-holm, immediately below the conical summit, where the father of the celebrated circumnavigator and discoverer, Captain Cook, was for some time hind or farm-bailiff. The path now led us up the abrupt ascent

* Bede, Eccles. Hist., B. III., c. iii., p. 112.

through a belt of fir-trees, many of which had grown to a considerable size, standing within the circular hollows, twelve to fifteen feet in diameter, the bases of the ancient British pit-dwellings. This Brigantian, or, more correctly, pre-historic village, is described by Professor Phillips* and others, and encircles the terraced brow of the lofty peak at a great height, a little below the cap of Oolitic sandstone that rests on the Lias. As the presence of water near at hand has usually determined the site of such primitive, pre-Roman settlements, there was pointed out, on the opposite side by which we descended, a spring of water, called, by tradition, Oswy's Well. It must have flowed more abundantly in ancient times, if the legend be true that tells of the little prince being drowned therein, in his play, when his nurse's eyes were closed in sleep—thus accidentally fulfilling the prophetic intimation of his early death. Few etymons are so exactly descriptive as this of Roseberry, which takes us back to the first Aryan migration into Britain, the Gadhelic or earlier Celtic occupation. No one who has passed along the narrow neck of rock that unites the shattered and weather-worn peak to the main mass of the mountain, like a miniature Striden Edge, and has then stood upon the giddy head-land, 1022 feet above the sea, can fail to notice the extreme appropriateness of the name, when he remembers that it is derived from the Gaelic or Earlier Celtic *ros*, a prominent rock or projecting head-land. (The same name is found in the village of "Ross," on the projecting point opposite Holy Island.) The "*berry*" simply refers to the Saxon "bury," and is often so spelt, the equivalent of the Celtic "dun," the hill-fort, that is, the primitive village of British days then lying beneath us. "Topping" is the Norse "Toppen," an apex or point, descriptive, like *ros*, of the peaked summit, which must have been a note-worthy landmark to the Danish invaders of Cleveland also, who have left other name-traces in its "Forces," "Becks," and "Dales." From this eagle's eyrie, we looked down beneath the overhanging gritstone-capping that crowns the hill, and saw the Upper Lias-shale forming a kind of concave slope below us, with the primeval pit-dwellings

* "Yorkshire," 2nd Edition, p. 203, etc.

ranged in irregular double order, and terrace succeeding terrace of bands of ironstone and marlstone; and then the extensive workings in the whinstone, which supply the material for paving the streets of Leeds and other Yorkshire towns. Beyond, in the great plain of fertile country, lay the villages and towns of Upper Cleveland, as far as the vale of the Tees, where Domesday Book ends at the ancient boundary between the separate kingdoms of Bernicia and Deira, which afterwards made up one great Northumbrian realm, that stretched from the Clyde to the Humber, and from sea to sea. Notwithstanding the haze in the far distance from the recent showers, the view was magnificent of the romantic outline of the great amphitheatre of the Cleveland hills on the south and west, with Captain Cook's monument, a lofty obelisk, on Earsby Moor; and, in the north, the ruined Augustinian Abbey of Guisbro', with its stately east gable and beautiful window, nestling in the valley beneath, which has been compared with Puteoli in Italy. Then, to re-call our thoughts to our own Tyneside, there were the busy industries, so quickly and marvellously developed, of Middlesborough and the Hartlepools between this and our intermittent glimpses of the blue expanse of the German Ocean.

Our route led us, in returning, through "Newton under Roseberry," where the curious emblematic sculptures and floriated crosses built into the walls of the little ancient church, recently restored, attracted attention. One stone above the porch looked like a grave-cover, with the Percy badge, probably a lion couchant, very indistinct and unleonine-looking, at the foot of the sepulchral cross. I imagine it to be similar to those sculptured tomb-flags discovered in rebuilding the adjoining church of Kildale in 1867, the Percies of Kildale being lords of this district. The dedication of the interesting old chapel of Newton is apparently unknown, but it was anciently under Ayton, and was given to that church in 1123 by Robert de Meinell to the abbot and convent of Whitby. It is singular to find in this neighbourhood so many noble proprietors who had also large possessions in Northumberland. As connecting the Roseberry with the Holy Island Field Meeting, we find that the moiety of Belford (*inter* *alia*) of the great barony of Muschamp came with Alice de Graham to this family of Meinell, when, in the beginning of the 14th century, she married Nicholas of that name. Besides the related Percy families of Kildale and Alnwick, De Brus, Lord of Skelton and Newton, succeeded Maybanoc of the Domesday Survey. The Balliols (of Barnard Castle and Bywell also) dispossessed Hannart and Uchtred, thanes of Stokesley. They endowed the Abbey of St. Mary in York with the church and certain lands in the time of Rufus, and parted with the fair seigneury under Henry II. as a marriage portion, with the hand of Ada de Balliol to John de Eure, Lord of Warkworth. At Great Ayton, (either from the Celtic *ea* water, the Leven (*smooth* river) flowing through it, or form the Norman-French *haie*, or *haye*, the *hedge*-enclosed town), the famous Nevilles, Earls of Westmoreland acquired the old manor of the Estotevilles by marriage in Edward III.'s time, and occasionally resided there until the attainder of Earl Charles, in the 13th year of Elizabeth's reign.

A short walk from Newton brought us to Great Ayton, which we found possessed a church, in part supposed to be older than the Conquest, and having some good architectural features, though blocked with unsightly galleries. The ancient structure is dedicated to "All Saints," and is about to be superseded by an imposing new edifice, closely adjoining. It is to be hoped that the old church of Ayton will be tenderly dealt with, as it deserves, and allowed to remain, at least, as a mortuary chapel.

The Rev. J. C. Atkinson, M.A., vicar of Danby, the well-known Cleveland naturalist, antiquary, and historian, has kindly sent me an interesting note on Newton and Ayton, regretting that he did not know of our Field Meeting, as he would have been glad, as an ex-member, to have joined our party. He considers the emblematic sculpture, built into the former church, as very early mediæval. There is another at Kirby, which may be part of an entry into Jerusalem. In the early Norman church of Marske is, or was, a corbel, with an animal sculptured, reminding one of the Newton slab. We were reminded by it of the North country legends of the "Laidley Worm of Spindlestone Heugh," near Bamborough, the famous Lambton Worm, and that of Linton in

Roxburghshire, with Dr. Bruce's tale from Procopius, of the swarms of serpents infesting the waste country beyond the Roman wall. For the sculpture represented a winged dragon, with enormous coiled tail, terminated with a minor head, confronting, with 'malice prepense,' a huge ox or other quadruped. I have seen an engraving of a similar relievo.* Of the fine early Norman church of Ayton one light remains, giving into the present vestry, and is a valuable architectural indication. There is a good plain chancel arch of two orders, also Norman. The one under the porch is interesting, too; and the corbel tables of the north and south walls, with the masonry of the south wall. Those who know Mr. Atkinson's work on the "Dialect of Cleveland," perhaps the best provincial glossary or word-book yet written, will be glad that his "History of Cleveland" is now in the press, though unfortunately delayed in the publication.

In the old church-yard of Ayton the parents and relations of Captain Cook are interred, far, indeed, from his own martyr-grave (for to science he was a martyr) in the Polynesian Seas. The Michael Postgate School, where he was educated, still exists in the village, though now disused. Our walk of about ten miles made the excellent dinner provided at the Golden Lion Inn, whence we had set out, to be duly appreciated. The quiet town of Stokesley takes its name, no doubt, like Stockton, its neighbour, from the Anglo-Saxon *Stoc*, a stockaded place, fortified by stakes or palisades. The members found sufficient occupation after dinner in reminiscences of this and other pleasant rambles; in examining a cream-coloured sparrow shot by Mr. Thomas Thompson at Winlaton in May last, which he had brought with him; and in discussing our proposed excursion for the following day, when Whitby, rather than Saltburn, was unanimously selected. No new member was proposed on this occasion.

The second day, Thursday, was devoted to the picturesque old sea-port and rising watering-place of Whitby, which we approached by the varied and beautiful scenery of Eskdale. In the

* Proceedings Soc. Antiq., Scot., vol. VII. See Service's Northumbrian Legends, p. 155, etc. Compare also Transactions T. N. F. Club, II., p 134-5. First Series. Mr. Ingham's Presidential Address.

heart of the Cleveland hills, at Glaisdale and Grosmont, we saw the iron-smelting works in active operation, in striking contrast to the pastoral scenes around. The weather was exceedingly fine, and the members much enjoyed the fresh sea-breezes and their visit generally. The great land-slip from the south cliff, with the undermined houses leaning quite out of the perpendicular, almost like the tower of Pisa on a lowly scale, were observed, as we crossed over to see the ruins of the famous Abbey, crowning the mighty cliffs, with its stirring memories, like Holy Island, of remote events that transport us through twelve centuries to the dawn of English literature and history. In St. Hilda's religious house, at Streonoshalh, reared on the summit of the dark cliffs 240 feet above the sea, the Whitby cow-herd, Caedmon, composed the first great English song, which Mr. R. S. Watson has recently set before us in its full suggestiveness of rugged beauty. In her earlier abbey, destroyed by the Danes long before the Norman Conquest, the points in dispute between the Irish and the Roman church were brought to an issue, in favour of the Latin usages. Its story has been often told, and never more eloquently than by the Dean of Westminster, when he spoke last year of this "Westminster of the Northumbrian Kings,"* wherein stood the tombs of Eadwine and Oswy, with queens and nobles grouped around them.

We noticed an artist busily engaged in transferring some of the most striking features of the ruined abbey to his canvas. The choir is entire, and the north transept nearly so, while part of the west front yet exists, and, though shorn of its central glory since the great tower fell in 1830, the remains are still magnificent in their present state. There is not much of interest in St. Hilda's modern church, but there was enough in the excellent Museum, rich in illustrations of the geology of the district, among which, if I remember right, is a gigantic winged saurian, Pterodactyle, having its living congeners in the East Indian *Draco volans*, and recalling the "flying serpent" seen the day before sculptured on the Newton slab. Did the ancient sculptors of these *Draconidæ*, our Newton friend especially, and the

* Green's History of the English People, chap. I., p. 26.

inventors of our northern serpent legends and that of St. George and the Dragon, ever meet, face to face, one of those "chimeras dire" in some remote dismal swamp? or, if not in the flesh, at least in the fossil (skeleton) form on an exposed Lias bed, near Whitby or Lyme Regis?

As the old historic town was visited by the Club in 1873, and described, with special reference to the botany of the neighbourhood, in the anniversary address, its singular mixture of ancient and recent, its flourishing jet manufactures, cliff walks and sea-beach, with the wide stretch of open sea, specked with innumerable sails, are no novelties to many of the members. In this respect, it differs from the Roseberry excursion, which furnished us with

"Fresh fields, and pastures new."

I need only add that after dinner, at the Royal Hotel, North Cliff, we took train, and arrived at Newcastle about eight o'clock; refreshed mentally and physically, and cherishing, for my own part at least, nothing but pleasant reminiscences of agreeable and profitable social intercourse amidst scenes of mingled beauty and sublimity, tending to enlarge the sympathies and elevate the mind.

One Evening Meeting was held, conjointly with the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne, on Wednesday, 23rd February, in the Museum of the Natural History Society. The Rev. G. Cooper Abbes presided, and there was a large attendance of members. The following papers were read, and will in due course appear in the Transactions:—"*On the Skull and some other Bones of Loxomma Allmanni*," by Dr. Embleton and Mr. Thomas Atthey; "*On the Articular Bone and supposed Vomerine Teeth of Ctenodus obliquus, and on Palæoniscus Hancocki*, n. s., *from the Low Main, Newsham, Northumberland*," by Mr. Thos. Atthey; "*On the larger Lepidoptera, obtained on our Coast, near the Mouth of the Tyne*," by Mr. J. G. Wassermann; "*Note on the Occurrence of the Eagle Ray* (*Myliobates Aquila*) *at Cullercoats, Northumberland*," by Mr. Jos. Wright; "*Notes on Lepidoptera observed in Northumberland and*

Durham in 1875," by Mr. William Maling. Additional interest was given to these Memoirs by the specimens themselves being exhibited; and two large cases of insects to illustrate that of Mr. Wassermann were shown, which were much admired. A case of three Shore-larks, which are very rarely met with, was also placed on the table by Mr. Thompson. One was shot in October last on Holy Island, by Mr. Isaac Clark; another was caught on Tyneside by a professional bird-catcher; and the third is the specimen, then living, mentioned in Mr. Hancock's "Catalogue of Birds,"* where he remarks, "The Shore Lark is a casual visitant, and is very seldom taken in our district. In June, 1851, a living specimen was bought in Newcastle market. I saw the specimen, but where it was captured is not known."

A subject of much importance to the well-being of our society has now to come before this Anniversary Meeting. We shall all unite in regretting very sincerely that circumstances have compelled two of the most useful of our colleagues to place their resignation of the office of Editor and Co-secretary respectively in the hands of the Committee. At the Committee Meeting held on Wednesday, 24th Nov., 1875, when the letters of resignation were read, Mr. R. Howse kindly consented to act as Editor of the Transactions *pro tempore,* and, subject to the wishes of the present meeting, as Mr. G. S. Brady's succsssor. It was also arranged that Mr. E. Dodds should be consulted respecting the office of Honorary Secretary. The cordial thanks of the Club for their valuable services in the past were conveyed to Messrs. Brady and Morison by letter at the same time. We must feel glad, however, that notwithstanding their retirement from offices which they have long and ably discharged, we shall not lose the great benefit of their help and counsel in the future, which they propose to give. Those of the members who have observed the laudatory appreciation which the successive issues of our Transactions have received in the critiques of scientific societies and periodicals, and even of some literary journals (from which any provincial scientific body like this may well derive a pardonable gratification), must be aware to what a large share of that

* Transactions, Vol. VI. New Series, p. 58.

very satisfactory result the unseen but arduous labours of the responsible Editor year by year have conduced. We cannot but express our sense of extreme indebtedness to Professor G. S. Brady for his careful supervision of the Transactions for the long period of twelve years, notwithstanding the pressure of professional work. Yet it will also give pleasure to our members to know that the newly-founded Chair of Biology, at the Durham College of Physical Science in this town, to which Mr. Brady was last year elected, will be filled by one so well qualified to take a high position in the number of its able and distinguished Professors. We shall heartily wish him "God-speed" in his new sphere of scientific and educational labour.

To Mr. D. P. Morison, also, we must express our special thanks, who for the past six years has undertaken, conjointly with Mr. Thomas Thompson, the duties, by no means light, that devolve on the Honorary Secretaries of so large a society as the Tyneside Naturalists' Field Club, to whose unfailing courtesy, large experience, and business aptitude, is owing very much of its present highly prosperous condition.

If we cannot submit to such unavoidable changes without at least a passing reference, it would still less become me to omit to refer to the loss which we have sustained during the last twelve months in the lamented decease of two of the former Presidents of the Club, who have ever taken a warm personal interest in its proceedings and its prosperity.

Mr. Robert Ingham, Q.C., of Westoe, South Shields, was one of its forty-seven original members, and was President in 1851. He lived long enough to see it increased thirteen-fold in numbers, while its sphere of usefulness has been proportionately extended. At the patriarchal age of eighty-two years, he passed to his well-earned rest, honoured and beloved as few have been by all classes and conditions of men. For myself, I can only speak of his kindness and courtesy in correspondence. But his private worth and public services are personally known to very many of our members, and they are the common property of all in the North of England, who know that he represented his native town from the time of the Reform Bill in several successive parliaments until he retired from public life. The same amiability of character which was so attractive in mature age was his characteristic in early youth, as I know from an old friend in Cumberland, his contemporary to the very year, who received him on his entering public school life at Harrow. He became afterwards a Fellow of Oriel College, Oxford. The Master of the Temple paid a graceful and touching tribute to the memory of our late revered colleague, as a valued and beloved member of that learned house, whose loss was universally deplored.

Mr. Rowland Burdon, of Castle Eden, whose beautiful "Dene" is so well known as a veritable paradise to the North Country naturalist, became a member of our Club in 1850, and was President in 1856. I had not the privilege of his acquaintance, though knowing much of him, especially through my friend, Canon Tristram, who for many years was his parish clergyman, and to whom I am indebted for some particulars connected with his scientific and other acquirements. Like Mr. Ingham, Mr. Burdon was a distinguished member of Oriel College in its palmiest days. As far as public life went he gave to his county, as the much-respected Chairman of the Bench of Magistrates, and in other ways, talents which his friends considered to be intended by Providence for his country and the world. But at the same time he was an accomplished naturalist, as well as a philologist, historian, antiquary, and a consummate critic. His library gave an idea of his varied and rarely-equalled intellectual grasp. As a member of the Tyneside Field Club I should mention his zeal to preserve the indigenous plants, nearly a score of which linger almost solely at Castle Eden, where they owe their continued existence entirely to his energetic watchfulness, *Cypripedium calceolus*, *Epipactis ensifolia*, *Pyrola rotundifolia*, *Ophrys muscifera*, and many others. Mr. Burdon was also master of the geology of his district, the Carboniferous and the Permian rocks. Yet from his amiable constitutional timidity his knowledge of most of these subjects was only given out unfortunately in private conversation, and in his many notes on the margin of the books which he read. He had a true naturalist's horror of artificial game-preserving, though a keen preserver of native game, and he always protected owls, kestrels, and other rarities. His private collection of birds of the county of Durham contains various unique specimens, *ex. gr.* White's Thrush. "A finished scholar, an accomplished man, a deeply-read theologian, an acute lawyer, and a keen lover of the fine arts as of nature,—alas! that his memory must die with his contemporaries. But he lived for duty and not for fame." Such is the high and noble encomium of a friend who knew Mr. Burdon better than almost any one. The fruitful seed from which grows up the harvest of a nation's greatness was here indeed in one of whom the aphorism might be said truly—

"The world knows nothing of its greatest men."

After thus noticing that which has specially concerned the Club in the past season, we may now pass on to one or two subjects of more general interest.

The Holy Island Field Meeting reminds me of a desirable subject for our consideration. During some excursions from the Tyne to the Farne Islands last summer, a deplorable destruction of the sea-birds took place; and I have thought that our Club might help, as on former occasions, to prevent in future this heartless and wanton massacre of young birds especially; at all events, by influencing public opinion. The cruel thoughtlessness of these excursionists, which showed itself, it seems, as soon as they set foot on the rocky islets, surely calls for the reprobation of every humane person, and humanity towards the lower creatures has always been, and always will be, the mark of the true naturalist. But for the late Archdeacon Thorpe, our President in 1852, who made noble and successful efforts for their preservation, many species of these sea-birds, which are one of the great attractions of the lonely Farnes, would probably have been entirely exterminated in their chief breeding grounds. In the original rules of our Club, as you are aware, this subject is by no means overlooked. It is declared (Rule XI.) "That the Club shall endeavour to discourage the practice.........of risking the extermination of rare or interesting birds by wanton persecution;" and it is afterwards added (Rule XII.), "That on the other hand members be requested to use their influence with the landowners and others for the protection of the characteristic birds of the county, and to dispel the prejudices that are leading to their destruction."

As regards the protection of wild birds in general, the denizens of our gardens, fields, and mountains, some difference of opinion exists, as the evidence collected by the Select Committee of the House of Commons, in 1873, only too clearly disclosed. For supposed reasons of political economy, food supply, etc., Major Morant, and other too strict game-preservers, think themselves justified in waging war *à l'outrance* against the *Raptores* and *Corvidæ* to the great regret of ornithologists, and to the injury of the country at large. It is but seldom that we have the opportunity now of seeing that "weird and majestic bird," the Raven, even in a cage, as I did in August last, at Rothbury, not far from its native haunts at Raven's Crag, on the rocky ridge of Simonside. It had been taken from the nest in the spring of the preceding year with a nest-fellow, which was sent to Dr. Charlton of Newcastle. The specimen which I saw was a fine one in perfect health, and nothing but the strong iron bars of its prison, against which it chafed and struck incessantly, prevented its efforts for freedom from being successful.

Yet, in the case of the feathered inhabitants of the Farne Islands, no plea whatever can be advanced even in extenuation of such wanton slaughter as that which is said to have occurred last season. A writer in a popular periodical has well remarked, "The Sea-Birds' Protection Act of 1869 met with general approval. Far from injuring man, sea-birds are positively beneficial to him. They act as scavengers at all sea-side villages; they fly inland and rid the farmer of noxious larvæ; at Flamborough, and similar rocky coasts, they warn the mariner by their screams and clangour during fogs to give a wide berth to an iron-bound shore. Their elegant forms and lively evolutions in sea or air delight all eyes. It was high time that ignorant and brutal holiday-makers were restrained by law from wantonly massacring them in the breeding season, under colour of selling plumes for ladies hats;"* or, as he might have added, I fear, of some of our Farne Island excursionists, with no object at all in view except the thoughtless gratification of an innate cruelty of disposition.† How strangely incongruous is this taking of innocent life to the *genius loci* of the Farnes, the undying memory of the heroic Grace Darling!

"The maiden gentle, yet at duty's call
Firm and unflinching as the lighthouse rear'd
On the island rock, her lonely dwelling place,
Or, like the invincible rock itself, that braves
Age after age the hostile elements,
As when it guarded holy Cuthbert's cell.

Turning to another subject, we are all old enough to remember when the central portion of the great continent of Africa was a blank; an "unknown region" was all that met the eye. In earlier maps small pictures of elephants were dotted about, instead of physical features or inhabited settlements, which gave rise to the famous epigram concerning Africa,

"Geographers on pathless downs
Placed Elephants instead of towns."

Within our own time this has all been changed. The recent arrival of Lieutenant Cameron in this country recalls to mind his adventurous walk across the continent, partly in the steps of the great and good Dr. Livingstone, but afterwards on ground probably untrodden before by foot of European. An important contribution to geographical knowledge has been made in his discovery of an *effluent*, hitherto unknown, from the south-west

* See Chambers' Journal, January, 1875.

† Since this address was read, petitions have been presented from the inhabitants of Alnwick and other towns to Parliament for the better preservation of Wild Fowl; and in the past session an Act has become law which will go far, it is hoped, to remedy the abuses referred to. It recites that the wild fowl of the United Kingdom, forming a staple article of food and commerce, have of late years greatly decreased in nnmber, by reason of their being inconsiderately slaughtered during the time they have eggs and young, and the protection afforded by the previous Act, 36 Victoria, owing to their marketable value, is not sufficient. It is therefore enacted that "wild fowl"—a list is given—shall not be taken between the 15th of February and the 10th of July, with penalties for infringing the law. The Home Office may vary the period. One half of this penalty is to be given to the informer, and the other half to the poor of the parish. Provision is made for the trial of offences committed within the Admiralty jurisdiction or on boundary waters.

of the immense lake Tanganyka, and by his more exact examination of the extensive river system of the Lualaba, under considerable difficulties; thus correcting previous misconceptions, and ascertaining, to a moral certainty at least, the identity of that river with the Congo, and the physical characteristics of the whole region.

Previous to this, we heard of Mr. Stanley's daring march from the coast to the Victoria Nyanza, which he was able to map out almost completely for the first time. He has demonstrated the vast proportions of this inland sea, besides having also the honour of discovering in its *affluent* on the south-east that which may prove to be the ultimate and most southerly source and actual fountain-head of the wonderful Nile. During my successor's term of office we may confidently expect to learn that here, in this mighty lacustrine system of Central Africa, the geographical riddle which has perplexed the wisest since the days of Herodotus has at length been solved; and that, too, by the undaunted courage and patient determination of men of the English race, whether it be by Mr. Stanley or by Colonel Gordon completing the work of Captains Speke and Grant, and of Sir Samuel Baker. At the Newcastle meeting of the British Association in 1863 the intrepid explorer Captain Grant explained what seemed then to be the true solution of the great river's immemorial mystery. Within the next few months it can hardly fail, but that the curtain will be lifted up for all future time.

I greatly rejoice that by missionaries of the Christian churches the work of exploration will be further carried on. The Church Missionary Society, especially, has established a prosperous station at Mombasa, on the East Coast, to which Mr. Forster, until lately in medical practice at Cullercoats, volunteered his services, and has now gone out. It has been enabled, by Christian zeal and liberality, to accept at once, in a practical manner, the invitation of the King of Uganda conveyed in Mr. Stanley's letter; and in God's providence it may yet come to pass that M'tesa may be, like the Kentish Ethelbert, or even our Northumbrian Oswald, the honoured introducer of Christian civilization into his part of Central Africa. Even in an address like this it may be permitted me to express the hope, in which all lovers of mankind will unite, that the "Livingstonia," and various other proposed British settlements on the great central lakes, will ere long be instrumental in furthering the cause for which Livingstone lived and died—in removing the fearful blight and curse of slavery, so that the barbarian kingdoms of Karagui, Uganda, and Unyora may begin to fulfil the lamented Captain Speke's prophecy, that, in course of time, from the nature of the land, they were likely to become "one of the greatest nations on the earth."

In referring to the geographical enterprise of last year, I can scarcely omit to notice the Swedish scientific exploration of the great river Jenisei under Professor Nordenskjöld, and the three Russian expeditions through Siberia, from which it seems highly probable that beneficial results will accrue to science. Commerce also will be benefited greatly if, as it is proposed, the Angura (a tributary of the Jenisei), be made navigable to Lake Baikal, and the Obi connected with the Jenisei, and the Jenisei with the Lena. When this is carried out there will be unbroken water communication inland from the north of Asia to the south, and from the west to the east, besides the sea communication between these lands and Europe. A Sunderland merchant captain, Captain Wiggins, has had the honour of demonstrating recently the latter route; and he has also been asked by the Russian Government to undertake a second expedition to Novaya Zemlya this year. "How great an extent of territory the proposed river communication will embrace is best seen by considering the extraordinary fact that the territory drained by the Obi-Irtisch and the Jenisei alone is of greater extent, according to Von Baer's calculation, than the river areas of all the rivers (the Danube, Don, Dnieper, Dniester, Nile, Po, Ebro, Rhone, etc.) which fall into the Black Sea, the Sea of Marmora, and the Mediterranean. Part of this territory, indeed, lies north of the Arctic Circle, but here too are found the most extensive and finest forests of the globe; south of the forest region proper there stretch out territories, several hundred leagues in extent, level, free of stones, covered with the most fertile soil which only waits for the plough of the cultivator to yield the most abundant harvests; and further to the south the Jenisei and its tributaries run through regions where the grape ripens on the bare ground." Such is the Swedish Professor's report of this new Land of Promise, who further tells of his companion's, the shrewd Norwegian farmer's cry of envy, when he saw it, "of the splendid land our Lord had given to 'the Russian,' and of astonishment that no creature pastured, no scythe mowed the grass."*

Meanwhile the "Challenger" Expedition has been adding many new discoveries to the domain of science, in the Pacific and Antartic Oceans by its deep-sea soundings and dredgings, which are watched with such interest by many of our members who have themselves done good service in similar operations on our own coasts. But it is to the opposite Pole and to the last Arctic expedition of the British Government that the minds of the English people everywhere have been directed for many months past with anxious expectation. Among the terrible icebergs of Smith's Sound, amidst the appalling darkness of the long Arctic winter Captain Nares and Commander Markham, with their brave scientific associates and picked crews, have been preparing to bring to light in the ensuing summer, if God will it, another and still more insoluble mystery of nature than that of the Nile sources. In that hitherto impenetrable region, where no foot of mortal man has ever yet stood, unless the Eskimo tradition of a lost tribe existing at the Pole itself prove true, the flag of England may this year be unfurled, and science in every branch, meteorology, geology, botany, zoology, and physical geography especially, be enriched through our countrymen's self-sacrificing bravery. Since the time when Captain Cook, the first scientific navigator, whose footsteps as a boy we followed in our last Field Meeting at Roseberry and Ayton in Cleveland, penetrated in 1778, the summer before his death at Owhyhee, as far as the Icy Cape, the North-West Passage has been effected by British enterprise, and the northern coast line of America, with its vast archipelago completely traced. But it is a singular fact that, notwithstanding the important discoveries in recent years

* Letter of Prof. A. E. Nordenskjöld, "Nature," Dec. 2, 1875, p. 95-7.

made also by the Swedish, American, German, and Austrian Arctic expeditions, even now about a million square miles immediately round about the North Pole remain unexplored.

And this brings me to the last subject on which I desire to touch, if I have not already trespassed too much on your time and courtesy. If Professor Boyd-Dawkins' theory be correct, a theory, however, in which the teachings of philology are intentionally ignored, we ought to hold the Eskimo tribes as lingering remnants of the earliest ancient Britons of the so-called Palæolithic and Mammoth period, who were driven northwards from Western Europe by the same climatal causes and oscillations of the glacial period which caused the migration of the reindeer and musk-ox towards the Arctic regions. In the Victoria cave near Settle, a very small fragment of a supposed human fibula has been found, which was referred at first indeed to a small species of elephant, but which is now thought to be a relic of our most ancient Northumbrian in the wider meaning of the word, one of those very far removed cousins or ancestors of ours. But Mr. Evans, the highest authority, considers the existence of the "Craven savage" extremely doubtful.*

I had intended to mention soms results of recent researches in connection with the migrations, settlements, and dwellings of pre-historic Northumbrians. But the limits of an address like the present will not admit of this. On some future occasion, I may be permitted to treat the subject, which is one of increasing interest, in a separate paper with sufficient fulness. Archæology, though the youngest, is the hand-maid of the oldest of the sciences, History. Where written human records cease to be available, pre-historic Archæology, investigating the monuments and relics of the primæval past, relates the story, until then, like Cambuscan's, only "half-told" of a nation's or of the world's childhood. From ancient habitations, such as caves, lake-dwellings, circular pits and huts, round towers and underground dwellings; from burial-tumuli, camps, and terraces, with their associated weapons, implements, and ornaments, we derive much trustworthy

* Presidential Address, Quarterly Journal of the Geological Society, 1875, Vol. XXXI., p. lxxiii.

information, if the examination be but carefully and scientifically prosecuted. The physical features of a country, moreover, the names of our hills and mountains, of our streams, rivers, and lakes, become valuable coadjutors in the enquiry, as they often take us back to the days and the migrations into Britain of our pre-historic forefathers, that is, to the earlier and later Celtic or pre-Roman times.*

As many of us have found pleasure and advantage in such investigations, and as many more of our members will possess similar opportunities, I may be allowed to suggest here that they might thus do efficient service to science, and obtain for themselves in archæological and philological pursuits much profitable and agreeable recreation. The acquisition of facts, as in all sciences, not the construction of theories merely, is the great desideratum. The co-operation of many competent observers has already advanced our knowledge of the pre-Roman age in Northern England, and the forthcoming exhaustive work of the Rev. Wm. Greenwell, F.S.A., who is our best authority on the subject, will throw much light on our pre-historic period, just as the Rev. Dr. Bruce has already done upon the Roman age.

Nor do I think that however far in the remote past we may push back the *origines* of our most ancient forefathers on sure and undoubted evidence, we shall find ourselves in necessary conflict with revealed Truth. To concede a greater antiquity to the existence of our race on the earth does not militate against any of the doctrines of Scripture, as the Duke of Argyle has shown. The poet Cowper, with most of his contemporaries, believed that the exact duration of the world was expressly revealed in the Book of Genesis. There is not one word in the Bible to prove this; yet he censures the geologists who

"Drill and bore
The solid earth, and from the strata there
Extract a register, by which we learn
That He who made it, and *reveal'd its date*
To Moses, was mistaken in its age."

But, on the other hand, the reverent interrogation of Nature,

* The word "*Lough*," for instance, proves a Gadhelic migration from Holy Island to the Solway, through the Isle of Man to Ireland.

which is the visible expression of the Divine mind, carried on in the truth-seeking spirit of the Baconian method of observation and experiment, will lead to the avoidance of dogmatism in those matters of science also, which are still "open questions." In the more recent utterances of many accepted leaders of scientific thought, we may notice an increased caution in speaking even of favourite theories of the present day. Professor Owen has lately told us that his last researches bring him no nearer to the proof of evolution; and, from anatomical considerations, Professor Huxley declared, many years ago, that there is "overwhelming evidence" for the unity of the human race.* Philologists now begin to trace out in the primitive agglutinative roots of the Turanian family of languages the mother-tongue of the whole earth when it was "of one language and of one speech." They are inclined to seek for it, not in the Aryan Sanskrit or the Semitic Hebrew, but in the language of that people which the oldest monuments of Babylon show to have been the first dominant race on the banks of the Euphrates, the Biblical cradle-land of our race. A late and distinguished member of our Club, Mr. Loftus,† in examining the ruins of Babylon was struck with the rudeness of the remains, as of the early stone age of modern archæologists, coarse pottery, perforated stones, and stone disks (like the threshing machine *with flint teeth* which Mr. George Smith met with in his recent visit);‡ while with these and an architecture of which the character of the ornament was of the rudest conceivable kind, there were proofs of incipient and "uneven" civilization in the beautifully graven signet-rings with their representations of figures in regal garments.|| Professor Rawlinson, after a long and careful examination of facts in cuneiform and written records, with all the light of modern research before him, cannot give to this period a higher antiquity than from B.C. 2300–1300; and he considers the early civilization of Egypt and Phœnicia to be still later. Thus, without reckoning the considerable

* Publications of the Palæontographical Society, Vol. XXVII., Dec., 1875; Report on the "Fossil Reptilia of the Kimmeridge Clay." Fortnightly Review, 1865, p. 277.

† "Chaldæa and Susiana," p. 164. ‡ "Assyrian Discoveries," chap. III., p. 36.

|| Joshua VII., 21.

addition of the Septuagint, the received chronology even of Archbishop Usher has some weight of authority on its side.

Nor when we consult physical science, where it borders on pre-historic Archæology, can we speak except with a cautious reticence. Principal Dawson, the eminent discoverer of *Eozöon Canadense*, proposes that instead of the Palæolithic, or Old-Stone Age, and the Neolithic, or New-Stone Age, with the succeeding Bronze and Iron Ages of Sir John Lubbock and his followers, we should speak of the divisions as *Palæo-Cosmic* and *Neo-Cosmic*, the Old and New World of mankind, simply our long-familiar Ante-diluvian and Post-diluvian, as satisfying all the requirements, even in connection with glacial theories and their relation to the antiquity of the human race. No hard-and-fast line can be drawn between these periods; they are, by general consent, allowed to be relative terms not of universal application, but useful within a limited space, and for present purposes. Our Neolithic or Bronze Age in Western Europe was probably synchronous with a high state of civilization in Western Asia; and even in Britain one nomad or settled tribe of pre-historic hunters might be more civilized, comparatively, than a neighbouring tribe, as is the case among the aborigines of North America to this day; and the same tribe might use and leave behind them different classes of implements in different localities, according to their varying pursuits and needs at different seasons of the year.

I have before me what I believe to be an axe of ironstone, similar to the Indian hæmatite-ironstone axes, of which only one example from Sussex is mentioned by Mr. Evans.* Until the incrustration at the thin edge flaked off lately from exposure to the weather on a garden rockery, I had not noticed any direct traces of human handiwork upon the nodule. Mr. Hugh Miller, F.G.S., first called my attention to the chippings on both sides, which bring it to a sharp edge, like the usual palæolithic celts of flint. A very dangerous weapon it would prove

* "Ancient Stone Implements of Great Britain," chap. IV., p. 76. This implement or weapon of clay-ironstone is nearly nine inches long, three inches wide, and two inches thick at the upper end.

either with or without a handle, in the grasp of a "rude barbarian;" but nothing more primitive can well be conceived. It was picked up some years since as a curiosity, the nodule being not unlike a human foot in shape, on the top of the debris thrown out of the east cist of the Warkshaugh barrow during its exploration, the same burial mound already referred to in speaking of our North-Tyne Field Meeting. Associated with it were an ornamented British urn of the food-vessel type, and a thumb-flint like the scrapers used by the Eskimos for preparing skins at the present day. Inhumation and cremation were contemporary burial usages in this barrow, where we thus have some of the characteristics of the Palæolithic, Neolithic, and Bronze Ages, if the people who burned their dead introduced also the use of metal, as we suppose, though no trace whatever of metal was found there. The very site of the burial-mound, only ten or twelve feet above the present level of the North Tyne, is against its extreme antiquity, for it is scarcely above flood-mark now, and the river embankment is carried up into the next field, showing its comparatively insecure position.

The different periods of pre-historic time, therefore, as we know from many similar instances, overlapped each other. They presented often undoubtedly contemporaneous conditions of human society, and not strictly successive, not separated by vast intervals of time, each represented by thousands of years, from one another. In this respect these periods may be compared with the simultaneous deposition of different geological formations going on at present in the ocean-depths in conterminous areas, but which were considered before to be widely severed in point of time.

Other considerations might be adduced to the same effect. The rate at which the stalagmitic flooring of ossiferous caves, as at Brixham and Kent's Hole, has been deposited, need not take us back into the illimitable past for the period of their human habitation, since we know that at Boltsburn, in Weardale, three-quarters of an inch of crystalline stalagmite had formed on boards, which had been placed there just fifteen years previous, in connection with the working of a lead-mine.* Nor can we think that the rate of peat-deposit gives to the relics of human origin buried beneath it a similar vast antiquity. The peat rests on the boulder-clay in South Uist in the Hebrides, and yet there have been found below the peat, and therefore proved to be older than all the superincumbent mass, not only a stone axe, and a bronze sword, but, which could hardly have been expected, a common Norway scoop or bailer.† The growth of peat on the moors of the Island of Lewis seems to have been comparatively rapid, for the laminæ in the section of a peat-bank there, show that nine feet have been accumulated in seventeen centuries.

It is conceded, again, by Mr. Evans and Professor Boyd-Dawkins, that no uniform unvarying amount of erosion of a river-valley can be insisted upon in reckoning the probable antiquity of the gravel-imbedded implements of Palæolithic man. The time when man was contemporary with the mammoth in the continental period of Great Britain and Ireland need not be placed so far back, if we recall the historic fact that the Island of Jersey, now separated from the mainland of France by fourteen miles of sea, was in the sixth century of our era severed only by a little stream over which a plank served as a foot-bridge. And as observers tell us that the distinctness of the glacial phenomena in the Hebrides appears to denote a more recent date than is usually supposed, so the historic evidence of the existence of the reindeer in Caithness, down to the twelfth century, points the same way.‡ Sir F. Palgrave shows that at the time of the Norman conquest our climate must have been much colder than it is now. The dome-roofed cells, with long tunnelled entrances on account of the rigour of the climate, such as the Eskimo hut or iglooë of Anastak in North Greenland, have their counterparts in the bo'hs of Lewis and the clochans of Kerry. But "Picts' houses" have been discovered south of the Forth at Bathgate, Lanark, and Lesmahago; and Dr. Smith found one of

* "Nature," December 18th, 1873.

† Proceedings of Soc. Antiq. Scot., Vol. VII., p. 194.

‡ "Cave-Hunting," chap. III., p. 76, A.D. 1159, from the Orkneyinga Saga.

these singular underground dwellings at Newstead, in Roxburgshire, in 1845, in whose construction most interesting dressed and moulded Roman stones had been used. A hexagonal bronze fibula or brooch was discovered during explorations a few years since, with several relics of the stone age, in the long-buried "bury" or so-called Pictish Round Tower at Edin's Hall, near Dunse, in Berwickshire. It is the most southern example of what Dr. Wilson calls "the earliest native architectural remains," with intramural chambers and stairs. The results of the excavations were very striking when I had the pleasure of visiting it with Mr. Milne Home, Dr. Beddoe, then President of the Anthropological Society, the late Mr. George Tate, F.G.S., and the Exploration Committee. Dr. Petrie considers the Irish Round Towers built near churches, to have been erected for defence against the Danes; thus serving the purpose of our Northumbrian Rectory houses, which were fortified against the Scots. All, so far as I am aware, are built near the sea, or at no great distance from the coast which the dreaded vikings would first ravage in their piratical voyages.

When we pass to the deductions of the craniologists, the succession of different pre-historic races in our country is confessed by some of the best authorities to be as yet very enigmatical. The *dolicho-cephalic*, or long-headed people, probably of Turanian stock, of the Iberian or Euskarian race, cognate with the Basques, Finns, and Lapps, were the first inhabitants, to judge from the evidence afforded by the long (burial) barrows, a form of barrow not one of which, I believe, has been found in this county. The primary interments often have above them secondary interments of the *brachy-cephalic* (to use again one of their euphonious terms), or Round-Heads, a race who drove the Spanish-Iberians into the mountains, where Tacitus recognised them in the ancient Silures on the borders of Wales, and into the wilds of Connaught, in the far west of Ireland. But the strange fact is, that after the Celtic Round-Heads, if such they were, came Long-Heads again; and, after them, Teutonic Long-Heads. Did the hereditary cranial characteristic re-appear in the second dolicho-cephalic race, through the recognised law of atavism? and possibly because the round-headed invaders were few in number comparatively, and, so to speak, were merged into the conquered people. Have we here a parallel case to the Slavs, who, for two centuries, dominated the Morea, as recent historical research proves, and yet are now undistinguishable from the modern Greek either in features or language? *Humanum est errare;* of the which we have a peculiar illustration in the great collection of crania lately bequeathed to the Oxford museum; a human skull having a jaw attached, which the living subject would have very decidedly objected to, because it was not his own.

The great antiquity of the human occupation of Scandinavia has been often sought to be demonstrated from the well-known *Södertelje hut* in Sweden; but more accurate observation has shown the evidence to be unreliable, and the date to be comparatively modern.

These instances, which might be largely extended, I have ventured to adduce, for a two-fold reason; first, to exhibit even thus incidentally the close connection which pre-historic archæology has with several other sciences; and, secondly, to present some considerations that may enable us to weigh more carefully the claims for the vast antiquity of the human race, so often dogmatically asserted without sufficient proof. After some amount of careful study given to the subject, I have come to the conclusion that, on this deeply-interesting question, there is a dangerous tendency to unscientific and hasty generalization on the old principle of "*omne ignotum pro magnifico.*"* Our present state of knowledge requires us to speak with a cautious reserve in this, as in so many other branches of science, wherein

* Whilst these sheets have been passing through the press, my attention has been drawn to the "Rhind Lectures on Archæology," delivered in April and May last, in Edinburgh, by Dr. Arthur Mitchell; which are extremely interesting and valuable, and afford strong corroborative evidence from a competent authority in favour of the views which I have expressed. See "Scotsman," April 19th, 22nd, 26th, and 29th, and May 3rd and 5th. I may be permitted also to refer to a masterly article, "Modern Philosophers on the Probable Age of the World," in the "Quarterly Review" for July, 1876, especially pp. 206, 207, and 212, 218; in which the conflicting views of the geologists, mathematicians, and physicists, are discussed. Some of the remarks made in the addresses of the distinguished presidents of the sections of Geology and Biology, Professor Young and Mr. Wallace, similarly inculcating caution, at the Glasgow meeting of the British Association this year, are equally worthy of attentive consideration.

the fallible and finite human mind seeks to fathom the deep mysteries of its own past history, of Nature, and of the ways of God, the Supreme and Infinite Intelligence, with man, whom He has made in "His own image, and after His likeness." After all, we must confess, as the wisest have ever done,

> "Thy powerful lawes, Thy wonders of Creation,
> * * * * * *
> Lye shadow'd under man's degeneration."

In conclusion, I have again to express my grateful sense of the high honour which you conferred at our last anniversary meeting, in electing me your President, and my regret that I have not been able to fulfil my responsible duties more worthily. I would also return my warm thanks for the great courtesy and kindness which I have experienced from all connected with our Club during my term of office. As in the past, so in the future, I trust that it will go on prospering more and more. During the last year a large number of new members have been added, and several valuable papers read. For myself, I have felt, as no doubt many of my predecessors have done, the benefit which accrues in being incited to take a more personal interest in the widely different fields of scientific observation and study which several of our members have so successfully cultivated. This variety of tastes and subjects of study seems to be reflected in the election to this chair of men of different idiosyncrasies, and their special turn of thought will impart a certain measure of variety to their yearly retrospect and address. It is well for the minister of God's word to have his sympathies enlarged towards all who are helping in the pursuit of truth; for fellow-observers in the wide fields of Nature's domains to gain a knowledge of each other's difficulties on the one hand, and proofs for religious conviction on the other; and, by such means, to be assured "that science, rightly interpreted, can never be discordant with God's Revelation, when that revelation is correctly understood."* For "the works of the Lord are great, sought out of all them that have pleasure therein."

* "The Geological Evidences of the Antiquity of Man Reconsidered," by T. K. Callard, F.G.S., p. 38.

Such investigations as the Tyneside Naturalists' Field Club has prosecuted for thirty years past are not only useful to science, but they are, above all, self-repaying.

"Nature never did betray
The heart that loved her; 'tis her privilege,
Through all the years of this our life to lead
From joy to joy; for she can so inform
The mind that is within us, so impress
With quietness and beauty, and so feed
With lofty thoughts, that neither evil tongues,
Rash judgments, nor the sneers of selfish men,
Nor greetings where no kindness is, nor all
The dreary intercourse of daily life,
Shall e'er prevail against us, or disturb
Our cheerful faith that all which we behold
Is full of blessings."

THE FIELD MEETINGS for 1876 were arranged to be held as follows:—

MAY 11TH	Gosforth Lake.
JUNE 5TH	Farne Islands.
JULY 13TH	Stawart Peel.
AUGUST 7TH	Stanhope.
SEPTEMBER 14TH AND 15TH	Leyburn, Yorkshire.

THE Treasurer's report (see p. 274) was read and adopted.

The following gentlemen were elected officers of the Club for the year 1876–7:—

President.

G. H. Philipson, Esq., M.A., M.D.

Vice-Presidents.

Joseph Blacklock, Esq.
D. O. Drewett, Esq.
H. B. Fell, Esq.
John Philipson, Esq.

Ralph Carr-Ellison, Esq.
Rev. J. F. Bigge, M.A.
D. Embleton, Esq., M.D.
Sir W. C. Trevelyan, Bart.
T. Sopwith, Esq., F.R.S.
Rev. Canon Tristram, F.R.S.
George Wailes, Esq.
Rev. G. C. Abbes, M.A.
Rev. A. M. Norman, M.A.
Rev. J. C. Bruce, LL.D.
Rev. A. Bethune, M.A.
E. J. J. Browell, Esq.
Rev. R. F. Wheeler, M.A.
Prof. G. S. Brady, M.D.
G. C. Atkinson, Esq.
H. B. Brady, Esq., F.R.S.
Rev. J. E. Leefe, M.A.
Rev. G. R. Hall, M.A., F.S.A.

Treasurer.

Robert Y. Green.

Secretaries.

Richard Howse. | Thomas Thompson. | Edwin Dodds.

Committee.

Thomas Atthey.
William Dinning.
John Hancock.
William Maling.
T. W. Backhouse.
James Clephan.
W. M. Wake.
E. C. Robson.
John T. Thompson.
Dr. Hooppell.
T. T. Clark.
Emanuel Young.

Auditors.

J. S. Foster. | T. P. Barkas.

The following gentlemen were elected members of the Tyneside Naturalists' Field Club during the year 1875–6 :—

At the Anniversary Meeting, 1875 :—Dr. George Bolton, Dr. Mordey Douglas, and Dr. Yeld, Sunderland; Messrs. James Stephenson, Newcastle; W. S. Creigh, Bulman Village.

At the First Field Meeting :—Rev. Percy Rogers, M.A., Simonburn; Messrs. C. R. Kendal, Hexham; J. Surtees, Newcastle; Peter Osbeck, Tynemouth; John Lincoln, Thos. Hudson, James R. Crease, Matthew Hall, and Thos. Pike, South Shields; John Hinde, Westoe; James Gillies, Charles Campbell, and Wm. Haddock, Sunderland; Rev. John Johnson, Gateshead.

At the Second Field Meeting :—Rev. G. E. Brice, Wark Rectory; Messrs. Geo. Renton, Consett; R. D. Edwards, Gateshead; Robert Collie, Newcastle; William Pinkney and John J. Addison, Sunderland; Robert Thubron, East Boldon.

At the Third Field Meeting :—John M. Fleming, M.D., Rev. C. W. Skemp, and Messrs. G. C. Hutchinson, Newcastle; Jos. Errington, Swalwell; Thomas Farlam, J. L. Armstrong, and William Johnson, North Shields; Ralph Atkinson, Whickham; Thomas Green, Monkseaton; Rev. J. Neil, Low Fell.

At the Fourth Field Meeting :—Messrs. Wm. Daglish and Geo. Fenwick, Gateshead; Edward Kersey, Newcastle; R. M. Middleton, Junr., West Hartlepool.

At the Evening Meeting, Feb. 23rd :—Rev. Thomas Myers, Westgate, Weardale.

THE TREASURER IN ACCOUNT WITH THE TYNESIDE NATURALISTS' FIELD CLUB.

Dr.	£	s.	d.	Cr.	£	s.	d.
1875.				1875.			
To Balance brought forward	90	18	10	By Printing	36	4	4
,, Subscriptions.......................	128	13	0	,, Plates	211	5	0
,, Transactions	64	0	11	,, Advertising	34	17	1
,, Natural History Society Transactions..	39	9	9	,, Commission	5	11	9
,, Ditto advertising	1	6	7	,, Postage	12	1	10
				April, 1876.			
				,, Balance	24	11	1
	£324	11	1		£324	11	1

1876, April 11.—Examined and found correct,

T. P. BARKAS, Auditor.

XVI.—*Note on the Underground Fire at South Shields.* By George Lyall, F.G.S.

The underground fire at South Shields having attracted some attention beyond the immediate neighbourhood, it was suggested to me by Dr. Hooppell that a few notes on the subject might not be unacceptable to the members of the Club, on the occasion of their Field Meeting in this locality. The main thoroughfares of Holborn and Commercial Road, between their points of junction at the Mill Dam and Mr. Edwards' dock, enclose an area of twenty-three acres, and it is near the centre of this enclosure that the fire prevails. This area contains several heaps or hills, some of them, as Carpenter's hill and Johnson's hill, rise between fifty and sixty feet above the street level, and have been formed chiefly of the refuse materials used in the manufacture of salt from sea water, for which South Shields was once famous. Up the sides and on the tops of these hills, streets and houses have been erected, and contain a considerable population. The earliest notice of the manufacture of salt here is in 1489, when Lionel Bell obtained from the Prior of Durham a lease for sixty years of a parcel of land near St. Hilda's chapel, on which he constructed two iron pans. In 1667, the accounts of the chapel wardens of St. Hilda show an assessment of one hundred and twenty-one salt-pans. In 1696, when the salt trade had reached its height, the number was one hundred and forty-three. From that time, Surtees tells us, this branch of trade gradually declined; and, in 1820, when he published his great work, only five salt-pans remained. Since that time, they have entirely disappeared.

The manufacture of salt from sea water was a very simple process. By the application of a slow heat, the water was evaporated, and the salt precipitated and dried. When the evaporation was completed, from seventy to seventy-five per cent. of the residuum consisted of the chloride of sodium, or common salt. The other principal and refuse solids were chloride of magnesium, sulphates of magnesia, and lime, with smaller proportions of other chlorides and carbonates, and combinations of bromine and iodine. These refuse products, together with waste salt, and furnace *debris*, were carried away to the rubbish heaps. The quantity of coals required for effecting the evaporation was very large; but, as fuel was cheap and abundant, not much regard, therefore, seems to have been paid to its economic consumption, for a very considerable proportion of the pan rubbish consists of coals and imperfectly consumed cinders, the combustion of which forms the present underground fire.

The first indications of a fire smouldering beneath the surface about Carpenter's Hill was observed in February, 1872, and in the following month the ground was discovered to be much heated, and smoke was seen issuing from it in several places. Iron rods were thrust down at various points to depths varying from six to fifteen feet, and after remaining a few minutes were found to be very hot. The fire extended to the streets and courts about the hill, and up to the present time about twenty houses have been destroyed, while many more are imperilled by its threatened extension.

A careful examination of a section of the rubbish deposit will remove any difficulty that may be felt with reference to the requisite supply of oxygen for sustaining the combustion. Some layers consist of fine granulated compact ash, but the greater mass is coarse and open, having numerous connected and ramified interstices and cavities filled with atmospheric air. Through these the gaseous products of combustion and vapours find their way to the surface, and the cavities containing air highly rarified by decomposition, and a hot temperature, obtain a continuous fresh supply by atmospheric pressure. With reference to the origin of the fire some persons think it has arisen from spontaneous combustion, or that a small smouldering fire has remained until now dormant in the pan rubbish since its first deposit; while on the other hand it is maintained that it originated from a strong fire applied externally to the heap.

From the chemical nature of the refuse deposit, the scattered position of its unconsumed coal, and the considerable time that has elapsed since its deposition, the conditions are entirely wanting to render at all probable the spontaneous combustion theory.

The same may be said with reference to the existence and maintenance of a dormant combustion for so long a period. The fire unquestionably originated near the base of Carpenter's Hill, among the oldest portion of the deposit, and close to Mr. Newland's foundry, against the outer wall of which was a furnace for drying moulds, but whether the fire was caused by this furnace there is not sufficient evidence to prove.

Since the commencement of the fire the municipal authorities have made strenuous efforts to extinguish it, or to cut off all connection between the part under combustion and the contiguous unaffected areas. The fire being entirely confined to Carpenter's Hill, the Corporation have, in order to separate this hill from Johnson's Hill on the south, cut a ballast trench to the clay the entire length of Hill Street, at a cost of two hundred and thirty-five pounds; and to prevent it spreading northward, they are now excavating a similar trench along Nile Street and Commercial Road, to join the end of the Hill Street trench, at a further cost of four hundred and twenty pounds.

XVII.—*Notes on the Occurrence of Lepidoptera in Northumberland and Durham, in* 1875. By WILLIAM MALING.

NOTWITHSTANDING the unsettled and ungenial weather experienced in the North, insects were rather plentiful, especially Noctuas; the common species of this division appeared in swarms. The warm, damp evenings in summer and autumn were very favourable for "sugaring"; and many varieties, as well as those of general occurrence, fell into the hands of the collector. It is the general opinion that rainy winters are more destructive to insect life than frosty ones, that intense cold produces little or no effect upon hybernating insects. It will, therefore, be worthy of note, during the coming season, if the recent heavy rains and floods produce any marked diminution in the numbers of those species which pass the winter underground; and should the winter pass away without severe frosts, the comparison will be a fairer one.

DIURNI (BUTTERFLIES).

The cold and wet weather prevailing during the summer months had a marked influence on butterfly life. Of the three familiar *Vanessæ*, viz.: *Atalanta* (Red Admiral), *Io* (Peacock), *Urticæ* (Small Tortoise Shell), there were few about, only an occasional straggler was to be seen on the wing.

The Orange Tip (*Anthocharis Cardamines*) and the *Fritillaries* (*Argynnis, Euphrosyne,* and *Selene*), usually plentiful in May and June, were rarely to be seen.

The same may be said of the generally common species, viz.: *The Gatekeeper* (*Satyrus Tithonus*), the *Meadow Brown* (*S. Janira*), the *Small Heath* (*Chortobius Pamphilus*), the *Common Blue* (*Lycæna Alexis*), and the *Small Copper* (*Polyommatus Phlæas*).

I have not heard of a single capture in this district of the *Camberwell Beauty* (*Vanessa Antiopa*) during the past season.

Of the spring brood of the *Common Whites* (*Pieris Brassicæ, Rapæ,* and *Napi*), few individuals were about; but the second brood of *Brassicæ* was much more abundant than I have noticed for several years, to the great annoyance of cabbage growers.

NOCTURNI (MOTHS).

The Convolvulus Hawk-Moth (*Sphinx Convolvuli*).—This magnificent moth appears to have been very abundant throughout the country during August and September. Individual specimens have been seen and captured on our coast, and at Darlington upwards of thirty were captured flying over the honeysuckle in the evening.

Lithosia quadra (*the Four-spotted Footman*).—A male of this local moth was found in June, at Sandyford, near the town.

The larvæ of the *Fox-Moth* (*Bombyx Rubi*) were unusually plentiful on the moors, feeding on the heather. Some I found on the coast, near Newbiggin-by-the-Sea, had been stung by Ichneumon flies during the earlier stages of their growth.

The larvæ of the *Cinnabar-Moth* (*Euchelia Jacobææ*) were to be found in swarms at Newbiggin-by-the-Sea, feeding on the common ragwort. About one-half of them were affected by the Ichneumon fly. I possess a remarkable variety of this common, but beautiful moth; the fore and hind wings being nearly black, with the crimson markings scarcely perceptible. It was bred by the Rev. W. L. Kay, late Vicar of Christ's Church, Shieldfield, Newcastle-on-Tyne, who kindly presented it to me.

GEOMETRÆ (GEOMETERS).

In September, I had the good fortune to find, in Thornley Woods, a fine male example of *Ennomos erosaria* (the September Thorn). This species is new to the locality, and is an uncommon insect. It had newly escaped from the pupa, the wings being quite limp.

Phigalia pilosaria (*the Pale Brindled Beauty*).—The earliest appearance of this moth was at Corbridge, on February 4th, when males were found at rest on the trunks of oak and elm.

Oporabia filigrammaria (*the Autumnal Moth*).—Three specimens of this moth were taken at light, near Newcastle, in September. The larvæ are supposed to feed on heather, but without doubt willows and sallows are the food-plants of the larvæ. No heather is to be found within a mile or two of the place of their capture.

Larentia olivata.—I met with this local species in Chopwell Woods, in July.

Cidaria populata.—I took a rather worn specimen in Chopwell Woods, in August. It is new to the district. *C. immanata* and *testata* were also rather plentiful; many varieties of the former resemble those taken in Scotland.

NOCTUÆ (NOCTUAS OR OWL MOTHS).

I have no captures of note to report of this group of moths; those of usual occurrence appeared in swarms. On the coast, *Agrotis valligera*, *Tritici* and *cursoria* and *Luperina testacea*, were very numerous.

In July, I found the young larvæ of *Dianthœcia carpophaga* and *D. Cucubuli* feeding on the seed-pods of the bladder campion (*Silene inflata*). When the larvæ have grown too large to conceal themselves in one of the capsules, they descend to the ground during the day; and on visiting the spot at night, in August, I found the nearly full-grown larvæ with their heads and anterior segments concealed in the capsules, and the remainder of the body exposed to view.

About the same time, the larvæ of *D. capsincola* may be found, feeding in like manner in the seed-pods of the white campion (*Lychnis vespertina*).

PYRALIDES AND *CRAMBITES.*

Pgralis fimbrialis (*Gold Fringe*).—I captured one example of this pretty little moth in August, flying at dusk, in Jesmond Dene. It is new to the district.

Pyrausta purpuralis (*Crimson and Gold.*)—I took two or three of this beautiful little species flying in the hot sunshine, near Hexham, in June.

Herbula cespitalis.—Rather plentiful on the moor at Newbiggin-by-the-Sea, flying by day. Second brood of the season.

Melia sociella.—I met with several specimens of this moth in July, near Hexham, the larvæ of which feed in bee-hives.

TORTRICES.

The best of my captures in this group were four specimens of *Peronea umbrana*, beaten from birch trees in Thornley Dene, in September. It commenced to rain, which prevented me from taking more. This is a very local species, and amongst the desiderata of most collectors.

I also took a single specimen of *P. Maccana* near Hexham, in September. This is also rare.

Amongst the *Tortrices* either taken or seen during the season, in various localities, were:—

Halias prasinana.

Tortrix pyrastrana, Xylosteana, Rosana, heparana, Ribæana, *Corylana, unifasciana, costana, Viburnana, icterana, viridana,* and *ministrana.*

Peronea, favillaceana, Schalleriana, variegana, Maccana, umbrana, ferrugana, and *aspersana.*

Teras caudana and *contaminana.*

Dictyopteryx, Læflingiana, Bergmanniana, and *Forskaleana.*

Argyrostoza Conwayana.

Ptycholoma Lecheana.

Penthina, pruniana, cynosbana, ochromelana.

Spilonota, dealbana, neglectana, suffusana, and *Roborana.*

Pardia tripunctana.

Aspis Udmanniana.

Sericoris cespitana, Lacunana and *Urticana.*

Cnephasia musculana.

Sciaphila, subjectana, vigaureana and *hybridana.*

Capua ochraceana.

Clepsis rusticana.

Bactra lanceolana.

Phoxopteryx Lundana, and *Mitterbacheriana.*

Grapholitha Paykulliana, Nisana, and *trimaculana.*

Hypermecia cruciana.

Pædisca corticana, and *Solandriana.*

Ephippiphora bimaculana, Cirsiana, scutulana, and *Brunnichiana.*

Semasia Wœberana.

Coccyx Hyrciniana.

Stigmonota regiana.

Catoptria Ulicetana, Scopoliana, and *Hohenwarthiana.*

Xylopoda Fabriciana.

Lobesia reliquana.

Eupæcilia angustana.

Xanthosetia Zoegana and *hamana.*

Argyrolepia Baumanniana and *cnicana.*

Cochylis stramineana.

Aphelia pratana.

Tortricodes hyemana.

TINEÆ (MOTHLETS).

Exapate Gelatella.—Two males at light, in November.

Ochsenheimeria Birdella.—Flying in the sunshine, among long grass, in July.

Tinea tapetzella, Rusticella, and *pallescentella.*—At rest on palings.

Lampronia Rubiella.—Flying among wild raspberry plants, in June.

Nemophora Swammerdamella, and *Schwarziella.*—Obtained by beating various trees.

Pepilla Curtissella.—In June, at rest on palings; very variable, some specimens nearly black. Found the larvæ feeding on young shoots of ash, in May.

Cerostoma radietella and *costella.*—In September; the former variable, scarcely two specimens to be found alike.

Harpipteryx harpella and *nemorella.*—Beaten from honeysuckle, in August. The latter is a local insect.

Depressaria costosella, liturella, Alstrœmeriella, Angelicella, applanella, ciliella (rare), *Chærophyllivorella, nervosella, Badiella,* and *Heracliella.*

Gelechia rufescentella, Ericetella, tricolorella, marmorella, and *mulinella.*

Chelaria conscriptella.

Dasycera sulphurella.

XVIII.—*Notes on some Macrolepidoptera occurring on the Coast, near the Mouth of the Tyne.* By John C. Wassermann.

The object of this paper is to offer a few remarks upon, and to give as complete a list as possible of the larger kinds of Lepidoptera occurring on our coast, within a short distance of the mouth of the river, about three miles on each side.

Before commencing with the list, I think there are two circumstances that I may mention. Firstly: that we get a hint of what the state of the country was in former times, when we take stray specimens of such insects as *Agrotis porphyrea, Calœna Haworthii* and *Eupithecia nanata,* which, in the larval state, feed on heather. These can hardly be accounted for otherwise than that they are the remnants of a Lepidopterous fauna, which flourished when the flat land to the north and south of the Tyne was a moor, more or less covered with heather. The heather has become almost extinct, for I only know of one or two tufts of it on the cliffs, near Cullercoats; and although Mr. Eales, of South Shields, to whom I am indebted for much information about the insects found there, has sought diligently for it, he has, as yet, been unable to find a single plant in that neighbourhood. He has, however, taken single specimens both of *porphyrea* and *Haworthii,* and a pair of *Eupithecia nanata,* and I have taken *Haworthii* at Cullercoats also. Secondly: the great traffic between our river and foreign ports has not been without its influence on our littoral fauna. The large quantities of ballast which ships bring over, and much of which is deposited on ballast-hills at the mouth of the river, contain insects in the larval or pupal state, and thus occasionally insects new to the district are introduced; as, for example, *Liparis Salicis,* which was taken on the ballast-hills last summer. More rarely, insects altogether new to this country are introduced, *Halonota grandœvana,* Mr. Eales' last addition to the British fauna being an example of this; for, although it is a by no means insignificant insect, it has only been found at Hartlepool in a locality precisely similar to that in which it was first discovered at South Shields.

I will now proceed to give a list, as complete as possible, of the Lepidoptera of the district, and will take the liberty of occasionally making a remark on some of the insects recorded.

DIURNI (BUTTERFLIES).

Are by no means common on the coast, the *Pieridæ* and *Vanessidæ* being the only two families at all numerously represented.

PIERIDÆ.

Pieris Brassicæ.—Not uncommon in gardens.

Pieris Rapæ and *Napi.*—Have swarmed in our gardens this year, to the great detriment of the cabbages.

Anthocharis Cardamines.—Seen once in the streets of South Shields.

VANESSIDÆ.

Vanessa Urticæ is not common at Shields, but common in gardens at Cullercoats.

Vanessa Polychloros.—I saw a specimen of this insect sitting on the palings of my garden, which had been smeared with sugar to attract moths, on the 12th of September last. See p. 142.

Vanessa Io is somewhat rare on the coast. I have seen it twice in my garden and once on the cliffs; and on the twenty-fifth of August last, Mr. Eales saw it at South Shields for the first time, although he has collected there for fifteen years.

Vanessa Atalanta.—Not uncommon in fields and gardens in the imago state. The larvæ are also to be found on nettles in hedge sides.

Vanessa Cardui.—In some years has been seen in numbers on both sides of the river, but for the last two years has been but sparingly met with. This butterfly has probably the widest range of any insect included in the British list. According to Dr. Koch, it is found in Europe, Asia, Africa, America, and Australia.

SATYRIDÆ.

Hipparchia Semele.—Some years ago this insect was plentiful on the limestone cliffs near Marsden, but has not been met with lately.

Hipparchia Janira.—Occurs sparingly in lanes.

Chortobius Pamphilus.—Is occasionally met with on grassy banks.

LYCÆNIDÆ.

Polyommatus Phleas.—Is never very scarce, and sometimes rather plentiful on the banks.

Lycæna Alexis.—By no means uncommon.

The above-mentioned are all the butterflies that, as far as I can find, have been noticed on our sea coast. They are few in numbers, and comparatively few specimens of each species, the white kinds excepted, are to be found.

NOCTURNI (MOTHS).

SPHINGIDÆ.

Smerinthus Populi.—Is common on both sides of the river. Several larvæ were feeding on poplars in my garden.

Acherontia Atropos.—Occurs both in the larva and imago state.

Sphynx Convolvuli.—Is usually rare, but in common with most other parts of the country we have had the pleasure of seeing them more commonly this year than usual. A fine specimen was found at rest on a scaffolding pole at South Shields, and is now in my collection. I also saw a large one hovering over some carnations in the garden, but having unfortunately laid aside my net, missed it. At Darlington, and in many other parts of the country, it has occurred frequently; and it is evident that this is as remarkable a year for it as 1873 was for the Camberwell Beauty. It is quite probable that it will not occur again, in anything like the same numbers, for a generation or more.

Deilephila Galii.—This splendid moth has become extremely rare of late years, and it is an open question if it is not altogether extinct, as far at least as the coast near the Tyne is concerned. About seven years ago, Mr. Eales obtained a larva, which was feeding on the Lawe at South Shields, and bred the moth.

Chœrocampa Porcellus.—Occurs now and then on the banks on both sides of the river, where the larva is sometimes found feeding on *Galium verum.*

Macroglossa stellatarum.—This insect, the well-known Humming-Bird-Hawk-Moth, is very irregular in its appearance. In some years, it has fairly swarmed on our coast, and then disappeared almost entirely. I had the pleasure of seeing two specimens in my garden, at Cullercoats, hovering over and feeding on the flowers of *Saponaria Calabrica*. The larva is often to be found on Ladies' Bed-straw (*Galium verum*).

HEPIALIDÆ.

Hepialus lupulinus and *sylvinus*.—Are common on both sides of the river, flying at dusk, close to the grass.

Hepialus Humuli.—This beautiful insect, the Ghost Swift, is one of our most conspicuous summer insects. The wings of the males are pure white on the upper side; and as these moths hover over the meadows late in the evening, their English name is very appropriate.

ZYGÆNIDÆ.

Zygæna Filipendulæ.—Is to be found on the cliffs, near Marsden and along the coast in some numbers.

LITHOSIDÆ.

Nudaria mundana.—Is found in the larva state feeding on the lichens growing on walls, near Marsden.

Lithosia quadra.—Mr. Eales caught a straggler on the ballast-hills, about the end of last June. This insect has apparently a weakness for turning up in unlikely places. In 1872, one was found on the Town Moor, Newcastle; and I found another directly afterwards in the heart of the town, in Summerhill Grove, Westgate.

CHELONIDÆ.

Chelonia caja (*the Tiger Moth*).—Is very numerous on both sides of the river.

Arctia fuliginosa.—Is occasionally to be found on the sides of railway embankments, near South Shields.

Arctia mendica.—Occurs in a marshy field near the Sunderland road, at South Shields, but can hardly be claimed as a coast insect.

Arctia lubricipeda and *Menthastri*.—The Buff and White Ermine Moths are common and conspicuous insects on our coast,

LIPARIDÆ.

Liparis chrysorrhœa.—Has been taken twice on the coast; once at South Shields on the ballast, and once at Cullercoats, at rest on a mignonette bed.

Liparis auriflua and Salicis.—Have both been taken on the ballast-hills, and have very probably been imported in the ballast, as before mentioned.

Orgyia antiqua.—In 1870, Mr. Eales saw the larvæ of this species in such vast numbers on the hedges, in the green lane leading from Harton to Marsden, that the whole of the hedges were denuded of their leaves for nearly fifty yards on each side of the road. Such visitations are, however, not common here, and are localised as this was.

BOMBYCIDÆ.

Bombyx neustria.—Was once found floating in a pond at the Lawe, South Shields; probably also an importation.

Bombyx Quercus.—The larva found on the bramble, near Marsden.

Odonestis potatoria.—Common on both sides of the river. The very handsome larva is often to be found on the coarse grass it feeds on.

GEOMETRÆ (GEOMETERS).

Rumia cratægata.—Common everywhere at the end of June.

Selenia illunaria.—Is found sparingly in hedges in June.

Odontopera bidentata.—Found sparingly in the lanes near South Shields water-works. Hardly to be considered as a real coast insect.

Crocallis elinguaria.—A single specimen taken on a gas-lamp in South Shields.

Boarmia repandata and *rhomboidaria.*—Occur commonly among hedges, and also in my garden. *Repandata* imitates the *Noctuas* in their liking for rum and sugar. I have frequently taken it when sugaring.

Acidalia scutulata, bisetata, incanaria, and *aversata.*—Are found but rarely on the coast.

Halia wavaria.—Is common in gardens in July and August.

Strenia clathrata.—One or two specimens have been found in July.

Abraxas grossulariata.—Not uncommon in gardens, but is by no means such a pest as it is inland, probably because fewer gooseberries are grown on the coast.

Hybernia rupicapraria, leucophearia, and *progemmaria.*—Are found in early spring, near hawthorn bushes.

Cheimatobia brumata.—Not uncommon, appearing on mild nights, in the depth of winter.

Oporabia dilutata.—A few have been taken on both sides of the river.

Larentia didymata.—One of our commonest species.

,, *multistrigata.*—Sparingly found.

,, *pectinitaria.*—Not common at South Shields, but at Cullercoats I find it plentiful. It is another of the few *Geometers* that come to sugar frequently.

Emmelesia albulata.—Occurs now and then at Cullercoats.

,, *unifasciata.*—Is taken at South Shields, but is a rarity.

Eupithecia centaureata.—Common on the coast; the larva is also to be found in the flowers of the ragwort. I once took a specimen at sugar.

Eupithecia nanata.—Mr. Eales once took a pair at rest on some palings, at South Shields.

Eupithecia vulgata, absynthiata, assimilata, and *exiguata.*—Are all found sparingly, flying in gardens, near hedges, and also at rest on palings and walls.

Eupithecia succenturiata.—One taken at Cullercoats.

Ysipetes ruberata.—Not commonly found near willows.

,, *elutata.*—Occurs sparingly, on the top of the cliffs, near Marsden.

Melanthia ocellata.—Not of common occurrence.

Melanippe montanata and *fluctuata.*—Both very common all over the district.

Anticlea badiata.—Common.

Camptogramma bilineata.—Is found very commonly flying in the bright sunshine, on the tops of the banks.

Scotosia dubitata.—One specimen of this moth was taken on the ballast-hills by Mr. Eales, on the 17th of August last.

Eubolia bipunctata.—Occurs in some numbers at Marsden.

Chesias spartiata.—Was once found on a gas-lamp, near South Shields.

Tanagra chærophyllata.—This insect, conspicuously clothed in deep black, is generally the companion of the above-mentioned *C. bilineata* in its flights on the banks, in the hot sunshine.

CUSPIDATÆ (CUSPIDATES).

Cilix spinula.—Is occasionally found in lanes, near the coast.

Dicranura vinula.—The well-known and beautiful Puss-Moth is common on both sides of the river. It used to be found in numbers on a few poplars that grew in a garden near the Bents, at South Shields; and this year there were many larvæ feeding on poplars and willows in my garden.

Clostera reclusa.—Was once found by Mr. Eales on the Lawe, South Shields.

Notodonta camelina.—Has been taken flying in a lane, at South Shields, in July, and the larva was found on the hawthorn in September.

Notodonta dictæa.—Was once found at South Shields; and I, this year, found two larvæ on poplars in my garden.

Diloba cœrulæocephala.—Has occurred, but not commonly.

NOCTUÆ (NOCTUAS OR OWL MOTHS).

We have now reached the great division of the *Noctuas*, by far the most numerously represented, both as to individuals and species of all the larger Lepidoptera in our districts. As will, probably, be known to most, the species of this group, with very few exceptions, are attracted by sugar, which is the usual way of collecting them. I have seen, on a fine night in July, certainly not less than fifty moths, sitting on and flying round a small patch of treacle or sugar, which has been rubbed on a rail; a very singular sight. They are also attracted by flowers; consequently, a garden, situated as mine is, close to the cliffs, is as good a collecting ground for this class of moths as one could well wish for and this is the reason of its being so often given as a locality.

Bryophila Perla.—Plentiful on lichen-covered walls.

Acronycta tridens.—Is occasionally found at rest on palings and walls, in August.

Acronycta Psi.—Is found in similar positions in June. In the imago state, this and the last species are almost exactly similar, and the collector has only the time of appearance to guide him in deciding which is which. The larvæ are, however, very different in appearance.

Leucania conigera, lythargyria, impura, and *pallens.*—Are all common on both sides of the river; between the end of June and the end of August. All come to sugar.

Nonagria (Tapinostola) fulva.—Is found at times near ditches and marshy places.

Nonagria Elymi.—This, one of the rarest species of British insects, occurs in some numbers at South Shields. It is found in the imago state from the end of June till August, and flies at dusk, near the Lyme grass, *Elymus arenarius.* Besides South Shields, it only occurs in the fens of Cambridgeshire and in Lancashire; and it seems an open question whether it is an introduced species or not. If any botanist, who has studied the flora of the district, would kindly inform us if *Elymus arenarius* is indigenous to the locality or not, it would go a long way towards answering the question, as it is the food-plant of the larva.* (See *Tapinostola Elymi*, Newman's Brit. Moths, p. 275.)

Chortodes arcuosa.—Flies commonly near ditches and hedge sides.

Gortyna flavago.—Is easily found in the larva or pupa state in the stems of thistles, on which it feeds; also, but rarely, in stems of ragwort, at the end of August. The moth flies in October and November.

Hydrœcia nictitans and *micacea.*—Common, at sugar.

Xylophasia rurea.—Abundant among nettles at Shields, and at sugar at Cullercoats.

Xylophasia polyodon.—One of our commonest insects. I have often seen twenty at one patch of sugar. It varies in colour, from a light tawny grey to nearly jet black.

Xylophasia lithoxylea, *sublustris*, and *hepatica.*—Are taken at sugar, at Cullercoats.

Chareas Graminis.—Flies in a field near Marsden.

Cerigo Cytherea.—Comes occasionally to sugar at Cullercoats.

Luperina testacea and cespitis.—Occur on the ballast-hills, and the former also at Cullercoats.

Mamestra abjecta, *anceps*, *albicolon*, and *Brassicœ.*—Come to sugar on both sides of the river. The last named is in the larval state, one of our garden pests, and sometimes swarms.

Apamea basilinea.—Common generally.

,, *gemina* and the variety *remissa.*—Are not uncommon visitors to sugar at Cullercoats, but scarce at Shields.

Apamea unanimis and *fibrosa.*—I have taken both at sugar at Cullercoats; they have not been taken elsewhere to my knowledge.

Apamea oculea.—Swarms all over the district.

Miana strigilis.—Taken at sugar at Cullercoats.

* *Elymus arenarius* is a very common plant on all the Sand-dunes of Northumberland and Durham, and certainly indigenous. See Flora Nat. Hist. Trans., Vol. II., p. 8, 1831, and New Series, Vol. II., p. 292, 1868.—Ed.

Miana fasciuncula, literosa, and *furuncula.*—Taken at Cullercoats and Shields.

Photedes captiuncula.—Occasionally taken at Marsden, in August.

Celæna Haworthii.—Mr. Eales once took a specimen at Shields, and I took another at sugar in my garden, at Cullercoats.

Grammesia trilinea.—Once taken at rest on flowers, at South Shields.

Caradrina Morpheus and *blanda.*—Have been taken on flowers at South Shields, in August.

Caradrina cubicularis.—Common all over in June, July, August, September, and October.

Agrotis valligera.—Common both at Shields and Cullercoats.

,, *suffusa.*—Seldom taken at Shields, more commonly at Cullercoats.

Agrotis saucia.—I took one specimen at Cullercoats in the beginning of October, but know of no other instance of its occurrence.

Agrotis segetum, exclamationis, cursoria, nigricans, and *Tritici.*—Common both at Cullercoats and South Shields. All come more or less readily to sugar. *Cursoria* and *Tritici* are very variable in their markings, as is also *valligera.* On the wing from June to September.

Agrotis porphyrea.—This insect swarms wherever its food-plant, the heather, is found; but on what plant the individual which Mr. Eales captured at South Shields had fed, is more than I can determine.

Agrotis præcox.—A great rarity on our coast. The late Mr. Tiltman, of North Shields, took one specimen, many years ago, on the Bents, at South Shields; and four years ago, I took another at the same place. These are, I believe, the only captures.

Agrotis ravida.—Although generally regarded as a great rarity, is not uncommon in this district. This year, I took about a dozen at Cullercoats, at sugar.

Tryphœna Ianthina.—Not uncommon at Cullercoats and Shields.

Tryphœna subsequa.—A single specimen of this rare moth was taken by Mr. W. Maling, the esteemed president of the Entomological Society. I know of no other capture.

Tryphœna orbona.—Common.

,, *pronuba.*—Swarms, and is a most variable insect, some specimens having the upper wings almost cream coloured, while others are as nearly black.

Noctua augur and *plecta.*—Occur both at Cullercoats and Shields rather commonly.

Noctua C-nigrum.—Comes to sugar at both places, and is double brooded, the first lot appearing at the end of June, and the second at the beginning of October.

Noctua rhomboidea.—One specimen taken at Cullercoats.

,, *brunnea.*—Is met with at South Shields in July.

,, *festiva, umbrosa, baja,* and *xanthographa.*—Taken at South Shields and Cullercoats, the last named insect very commonly.

Tæniocampa Gothica.—Occurs in spring, on the coast generally.

,, *rubricosa.*—Has been taken near Whitley, in spring.

,, *instablis* and *stablis.*—Also occur on both sides of the Tyne.

Orthosia Upsilon and *lota.*—Have been taken at South Shields, but are rare.

Orthosia macilenta.—Taken on both sides of the river.

Anchocelis pistacina, lanosa, and *litura.*—Common autumn insects.

Scopelosoma satellitia.—Has occurred at South Shields.

Xanthia ferruginea.—Of very common occurrence.

Dianthæcia carpophaga, capsincola, and *Cucubali.*—Frequent the flowers of the campion in summer. Generally distributed.

Polia Chi.—Common on walls, and at sugar in autumn. The var. *olivacea* (a dark form of this species), which is, I believe, peculiar to the north of our island, is the more common form taken.

Miselia Oxycanthæ.—Occasionally taken at South Shields. I have also taken it at Cullercoats.

Phlogophora meticulosa.—Common at sugar.

Euplexia lucipara.—Once taken at Cullercoats.

Aplecta occulta.—I took a fine female of this species at sugar, at Cullercoats. It is larger than the Scotch form, and is of the same colour as English specimens. It differs in this respect from most of our local Lepidoptera, which resemble, as a rule, the northern forms.

Hadena adusta.—Occasionally taken.

,, *dentina.*—Taken once or twice at South Shields.

,, *Chenopodii.*—One specimen taken at Cullercoats. I am not aware of its having occurred in the northern counties previously. It has always been considered a southern insect.

Hadena Pisi and *oleracea.*—Very plentiful in summer.

,, *thalassina.*—Once taken at South Shields.

Calocampa exoleta.—Common at South Shields.

,, *vetusta.*—One specimen at Cullercoats.

Cucullia umbratica.—Found on both sides of the river, generally at rest on rails, etc.

Heliothis marginata.—Common in some years at South Shields.

,, *peltigera.*—Two specimens of this moth (a great rarity in the North of England) have been taken at South Shields.

Heliodes Arbuti.—Once taken near Marsden.

Abrostola Urticæ.—Common among nettles in June.

Plusia Iota.—One specimen taken at South Shields.

,, *Gamma.*—Very common, flying from spring to late autumn.

Gonoptera Libatrix.—Not uncommon.

Amphipyra Tragopogonis.—Very common in September.

Mania (Nænia) typica.—Common in summer.

Mania Maura.—Has occurred at South Shields.

I hope to be able to supplement this list with further species occurring near Cullercoats, but fear that, as the best collecting ground at South Shields is being so much encroached upon by new heaps of ballast and rubbish, we cannot expect many additions to the fauna from that locality, the Lepidoptera having rapidly diminished in numbers in the last few years.

XIX.—*Memoir on the History and Architecture of Chipchase Castle, North Tynedale.* By the Rev. G. Rome Hall, F.S.A.

It has recently been remarked that Northumberland has much to show the traveller in many ways, from the Roman Wall onward, but the feature which is especially characteristic is that it is "the land of castles." Of the fortified baronial residences called Pele-towers,* those large square Keeps, which are chiefly to be found in Tynedale, the earliest and most imposing is undoubtedly Chipchase. The unrivalled beauty of its position, the site being a gentle eminence above the banks of the river North Tyne, in one of the loveliest parts of the valley, has been often remarked.†

* Pele, or Peel-tower, was the usual name of the smaller castles, which had not the central courtyard characteristic of the castle proper. They were very numerous on, and almost peculiar to the Anglo-Scottish Borders, and were rendered necessary on the Marches by the incessant warfare which prevailed down to a recent period. Sax., *pil, moles;* Lat., *pela, pelum,* a pile, a fortress, originally applied to defences of earth mixed with timber, strengthened with *piles* or *palisades,* like the fortresses of the Britons described by Cæsar. "Pele" occurs in Robert de Brunne's "Chronicle," and in Barbour's "The Bruce;" "pell" in Chaucer's "House of Fame." See Brockett's Glossary of North Country Words, 3rd Edit., Vol. II, p. 68. Compare "Bastile," or Bastell-house, and the notorious Bastile, the state fortress of Paris.

† Wallis's Hist. of Northd.; Hodgson's "Beauties of England and Wales," Vol. for Northumberland, etc., etc.

As the district belonged to the Scottish kings until the end of the thirteenth century, it would be useless to expect any record of the first erection of the old tower of Chipchase Castle;* but from the architectural features, we arrive at the age with some approach to certainty, and know that it was probably built by Peter or Robert de Insula in the time of Edward I., some years before the close of his reign in 1307. The Rev. C. H. Hartshorne, in his "Feudal and Military Antiquities of Northumberland and the Scottish Borders,"† says, "The history of this charmingly-placed structure appears to have been pretty well made out. Originally it belonged to Odonel de Umframville (Lord of Prudhoe). Gilbert, the Flower of the North, held it *in capite*‡ amongst other possessions from the Crown, and Peter de Insula held it under him, with Withill, for the third part of a knight's fee. It must have been either this person, or his son Robert, who built the castle, as Robert was in possession 2 Edw. I." (1274).

The name of *Chipchase* itself takes us, however, back to much more ancient times, when a village of Chipchase already existed on the south side of the present park, close to the bridge that leads to the mill and the ancient ford of the river. Scarcely a vestige now remains of it, but we can trace the foundations of two or three dwellings on each side of the hollow track-way. The ancient village of Chipchase was, no doubt, much earlier than the great Pele-tower, and would be occupied in Saxon times. Its name is derived directly from the Old-English word

* Tynedale was granted to the brother of Malcolm, King of Scotland, in the time of Henry II. On Malcolm's death it became united to the Crown of Scotland, and so continued till the death of Alexander III. in 1286, when it reverted to the English Crown. The Scottish Judges Itinerant held their assize on the Mote Hill of Wark in 1279, and the English Judges in 1287.

† Chap. II, p. 78. See also "Testa de Nevill," "Chipches," Hodgson's Hist. of Northd., Vol. I., Part iii., p. 206.

‡ "In chief," or directly from the King. These powerful barons had almost as many modes of spelling their surname as they possessed manors, owing perhaps to the Norman French pronunciation of the second syllable. "Umfraville," or "Umfreville" seems to have been the most usual form, though *seven* other modes occur in a cursory perusal of some ancient records.

Cheap, a market; Anglo-Saxon, *ceapian*,* to buy; *cypan*, to sell; and *cheap*, price or sale, which occur in Cheapside and East-Cheap, the old market-places of London, and in the numerous *Chippings*, scattered throughout England, denoting ancient market-places and early seats of commercial activity.

The second part of the name of Chipchase comes from the Norman-French *chasse*; French *chasser*, to hunt, signifying a place of hunting, ground abounding in game, such as the various species of deer, the wild boar, (once common in this district, to judge from the local names of Swinburn, etc.,) bears, wolves, and smaller objects of the chase. The "forest," like William the Conqueror's New Forest in Hampshire, seems to have been the most extensive kind of hunting ground; next to this came the "Chase," like Hatfield Chase, in Yorkshire; then the "Hunt," like Cheshunt, in Hertfordshire; and last, and smallest of all, the enclosed "Park."

Thus the meaning of Chipchase is the "market"† within the "Chase" or hunting-ground of the Lords of Prudhoe, the great family of the Umfrevilles, or Umframvilles who held it as a detached manor of that important barony, when the light of history first dawns upon Chipchase. The traditional site may have been near the principal entrance to the Castle grounds, below the Steward's or Close House, which is still called the "*China* gate," from some popular reminiscence of the former market and its wares. The village itself continued to be inhabited, as I find from the parish registers, to nearly the end of the last century; and I have known an old parishioner whose relations were born and lived there. Leland, in his "Itinerary," writing about the middle of the sixteenth century, describes

* In Norse names the forms are *Cope* and *Köping* (pronounced *Chaping*). Copenhagen, the capital of Denmark, is the modern corrupt form learnt from the French, of the Danish *Kiöbenhavn*, Haven of Commerce. Compare Bosworth's Anglo-Saxon and English Dictionary, *sub voce* "*Céap*." A "*Chapman*," A. S. *Ceapman*, Swedish, *Koepman*, is a peddlor or merchant; see Jamieson's Scottish Dictionary, and Taylor's Words and Places, p. 373. 2nd Edit.

† The owner of the soil, as lord of the market by royal grant or immemorial user, levied a toll, by his officer, on every buyer, and for security contracts were made in his presence.

"Chipchace" as a "praty toun* and castle hard on the east part of the arm of the North Tyne which divided Tynedale from Northumberland."

In its early days, the Lords of Prudhoe Castle had only a small fort or enclosure here, (the rude foundations of which may be seen a little to the south of the castle within the present park), which would be of use for the defence of the ancient vill or hamlet.†

The private chapel of the castle, now standing to the south-east, also within the park, and used for Divine Service, the writer being the present chaplain, was rebuilt by Mr. John Reed, who bought Chipchase in 1732. It does not occupy, however, the site of the very old religious edifice, which was erected more than a century, at least, before the great Tower, and formerly stood near the front of the castle. Odonel de Umframville, 18 Henry II., gave the chapel of Chipchase‡ to the Canons of Hexham Abbey, on whom would devolve the duty of serving this and the other four chapels of Birtley, Gunnerton,‖ East Swinburn, and Colwell, in the immediate neighbourhood, and within the old parish limits of Chollerton, the Mother Church. This gift was in the year 1172; but, at the same time, he carefully reserved the Manor to Robert de Umframville, his son and

* Chap. vii., fol. 75., p. 507. In Eschaetae, 10th Queen Elizabeth and 14th Charles I., "*Chipches cum Villa*," occurs. In Sir R, Bowes' Survey of 1552, Hodg. Hist., Part III., Vol. II. "Chypchase and Symondburne Castles" are stated to be the fittest residences for the Keeper of Tynedale, and preferable, for strength, to Haughton. A bridge is suggested to be made over the North Tyne, "under the towne of Chypchace," for mutual help in time of war. But this excellent advice was never carried into effect. In 1553 the village had its Bailiff in William Ledell or Liddell. See Bishop Nicholson's "Border Laws," p. 259. By the "Statute of Barwicke" fifty horseman and twenty foot soldiers were to be placed at Chipchase.

† This enclosure has only a slight resemblance to the numerous ancient British camps or towns near Birtley and Barrasford. See *Archæologia Æliana*, New Series, Vol. VII., p. 4., etc.

‡ The Abbot of Newminster tested the deed by which the Prior and Canons of Hexham granted to Peter de Insula and Robert his son to have a *Chantry* in the Chapel of Chipchase every other day of the week, at the expense of the Mother Church of Chelverton (Chollerton). Hodgson's Hist. of Northumberland, Vol. II., Pt. ii., p. 416.

‖ Of this chapel no trace exists, but it stood a little to the east of and on higher ground than the site of the old castle of Gunnerton, of which only part of the wall in ruins now remains. The former inn was built within the ancient churchyard.

heir, in whose family it continued for several generations. About that time the old Pele or Castle of Birtley, formerly "Birkley," was probably built, to judge from the remains of Norman dog-tooth ornament and other architectural relics, which may possibly, however, have come from the adjoining ancient chapel, and from the ruined walls of the tower, still existing in the Vicarage garden. These relics date from the latter half of the twelfth century, though some of the mouldings may belong to the thirteenth. Birkley Castle, of which no historic trace can now unfortunately be found, was from its stronger defensive position, more likely to be first selected as a temporary residence of the Umframvilles (or the De Insulas under them), in whose barony of Prudhoe, now one of the Percy baronies, it is still included as a detached manor. The ancient chapel of Birkley, now completely modernised but remaining as the parish church of Birtley, seems to have been endowed by the same family, and land assigned by gift to the great religious house of Hexham; for an adjoining field still bears the name of "The Prior's Croft."

We come now to the second and more interesting period of the history of Chipchase, that of the building of the great Pele-tower, or square Keep, of the Castle. Although Mr. Hartshorne considers the builder to have been Peter or Robert de Insula,* in whose possession the manor was held, under the Umframvilles, from about 1272 to the beginning of the fourteenth century, Mr. J. D. H. Longstaffe (one of the secretaries of the Newcastle Society of Antiquaries), and an excellent authority, thinks the latter half of the fourteenth century more probable. Mr. Longstaffe, to whom I am indebted for some interesting notes on Chipchase, believes that the machicolations around the summit of the tower and roof, resting on corbels, with openings, (through which stones and boiling water were thrown down on the assailants or besiegers,) are of a character earlier than those of Lumley and Hilton Castles in the county of Durham, and that the windows are of the date of those in the aisles of the parish church at Darlington, circa 1370. If these windows were not insertions

* In Godwin's "English Archæologist's Handbook," (1867), p. 197, Chipchase is stated in the list of Castles to have been "Built by Peter de Insula, c. 1250"

later than the original building, then the Pele-Tower may have been first erected by the husband of the heiress of the De Insulas or Lisles, about that time.

Cecily, daughter of Sir John Lisle, Knight, married Walter Heron, brother of John Heron of Ford Castle in North Northumberland, and of Sir William Heron "the blind," of Simonburn on the opposite bank of the North Tyne. Sir George Heron, then keeper of Tynedale and High Sheriff of Northumberland, 13 Queen Elizabeth, was slain in the Border fight of the "Raid of Reidswire," in July, 1575, when some of the English prisoners received falcons as presents from the Scots, who said that the English were nobly treated, since they got live *hawks* for dead *herons*.* A branch of the same family of Heron,† it may be mentioned, resided also at Birkley Castle, which is about a mile and a half distant to the north, where, on a stone in the castle wall and on the oaken framework of a panel, John Heron has carved his initials, with those of his children, and the dates 1611, etc. The new owners of Chipchase were descended from the Hairuns or Herons of Chilton, in this county,‡ who give a single noble heron of the Skerne on their seals. The family

* Godscroft, quoted by Sir W. Scott in Notes to "The Raid of Reidswire," ("*Border Minstrelsy*"). Probably "Sir George Heron, of Chipchase," who figures in the "Monastery," chap. 37, is intended for the same person.

† From Mr. Hodgson's transcripts, taken from an old manuscript book in the possession of "the late Mr. R. W. Grey, of Backworth," giving the "Rentals and Rates for Northumberland, with the Proprietors' Names, in 1663"; we find that the Chipchase estate in Sir Cuthbert Heron's time was very extensive. It included

	£	s.	d.
Chipchase, Rochester, Chipchase Mill, and Birkley Tythe	220	0	0
West Whelpington, Ray, and Blackhalls	120	0	0
Ravenshaugh, Ninwick, and Pundershaw	75	0	0
Gofton and Blackbourne	28	5	0
Sueing Sheels, Hallbarnes, Over Town, Sharperley, and Tepper Moor	175	0	0
Simonbourne Castle and Bournhouse	44	0	0
Hindbridge, Hall Hill, Over Rag, Nether Rag, Shitlington, and Over High Ridges	26	10	0
	688	15	0

Snapdaugh, Newbrough Tythe.
East Broken Haugh Tythe, Corbridge Rectory.

Hodgson's Hist. Part iii., Vol I., p. 336.

‡ See "Magnus Rotulus Pipae," or Pipe Roll for Northd., Anno 1196-8, Richard I. Hodgson's Hist., Vol. III., Pt. iii., p. 58. Also "Preface," p. xvii.

coat-of-arms which arose from this device was three herons;* and it appears over the door-way of the manor-house, the handsome adjunct to the ancient Keep, which was added on by Cuthbert Heron, in the time of James I. This Cuthbert Heron was High Sheriff of the county in 1625, and for his loyalty, and that of his brother Colonel George Heron, (who fell at Marston Moor,) was created a baronet by King Charles II., in 1662. From Sir Harry Heron, who had before sold Nunwick to Mr. Robert Allgood, Chipchase passed, by purchase to Mr. George Allgood about the end of the seventeenth century,† and from the family of Nunwick to Mr. John Reed, connected with the old Reedsdale family of Troughend, who bought it in 1732. Mr. John Reed was succeeded by his nephew, Christopher Soulsby, who took the name of Reed, and obtained the estate. He was High Sheriff of Northumberland in 1764. The son of the latter Colonel John Reed, was the principal partner in the ill-fated Northumberland Bank when it failed, and his assignees sold Chipchase in 1825 to the guardians of R. W. Grey of Backworth who was then only eight years old. Mr. Grey sold it in 1861 to Mr. Hugh Taylor of Backworth, the present owner who has since greatly improved and extended the property.

The architectural features of Chipchase Castle are of singular interest. Speaking of the beautiful Manor-House attached by Cuthbert Heron in 1621, Mr. Hartshorne says that the old Tower is "rendered additionally interesting from its union with a building of a later age, which in itself would be attractive amid the best specimens of the Jacobean style. The pele, properly so called, is a massive and lofty building, as large as some Norman Keeps. It has an enriched appearance given to it by its double-notched corbelling round the summit, which further serves the purpose of machicolation. The round bartizans at

* Within the memory of those now living, herons used to build on the highest trees of the Chipchase woods, where formerly, no doubt, had been the old heronry of the castle. They still cling to the old place, for quite recently a pair of herons were in the habit of building their nest near the bank of the river a little lower down.

† Wallis's "Hist. of Northumberland" (1769), p. 47, etc. See also Horsley, in "edited Contributions to Hist. of Northumberland" (1729-30), p. 37.

the angles add to its beauty, and are set in with considerable skill. The stone roof and the provisions for carrying off the water deserve careful examination. Over the low-winding entrance-door on the basement are the remains of the original portcullis, the like of which the most experienced archæologist will in vain seek for elsewhere. The grooves are also visible, and the chamber where the machinery was fixed for raising it is to be met with, even, as at Goodrich, where the holes in which the axle worked, and the oil-way that served to ease its revolutions, may be seen; but at Chipchase there is the little cross-grated portcullis itself, which was simply lifted by the leverage of a wooden bar above the entrance, and let down in the same manner."

A few years since, in exploring the old Keep with the Rev. Wm. Greenwell, F.S.A., of Durham, we discovered among the intra-mural chambers, a little chapel* in the thickness of the walls, opening on the principal chamber. This is the third story of the great tower, above the guard-room, which would be devoted to the use of the family of the castle. In the guard-room itself, used by the soldiery or men-at-arms, beneath which, on the ground floor, is the usual vaulted room for securing cattle in the time of danger, may be noticed an open closet formed by the insertion of a piece of *earlier* work, as Mr. Longstaffe supposes. The closet is formed of two little arches, with mouldings, which seem to be of Early English date; and these (if not insertions, but, as I incline to believe, contemporary with the first erection of the tower,) would give us Peter de Insula as the probable builder, whom the "Testa de Nevill" records as the possessor of the Manor of Chipchase in the year 1275,† when the Early English or Lancet order of architecture is presumed to end. There is a window in the north face of the tower, which is of the later perpendicular style, and about a century later. There are no mason marks to be met with on the masonry

* It is in the north-east angle, and alike in dimensions and furniture would resemble the Prophet's "little chamber on the wall" at Shunem, 2 Kings iv. 10.

† Hodgson, Hist. of Northumberland, Vol. I., Part iii., p. 206.

either at Haughton Castle or Chipchase; but it must be remembered that these are unusual up to the reign of Edward II. Traces of the ordinary mediæval decoration of the interior walls of castellated residences may still be seen in the tattered fragments of mural Gothic paintings, especially in the third story or family chamber.

The later works, which belong to what we might term the third period of the history of Chipchase, possess high interest also in their way. Within the more modern Manor House, built, as we have seen, by Cuthbert Heron in 1621, is a mantelpiece, of the Jacobean age, or as some suppose, perhaps older. It is an elaborate carving in black oak representing "The March of Time," and is a noble effort of art, in deep relief, presenting fine effects of light and shadow. This adorns the "Music-room," as it is called, of the Castle, a lofty apartment, used as the library, which has a richly-wrought and elaborately ornamented cornice round the ceiling that compares favourably with anything similar in the North of England.

Passing from the interior to the exterior, it may be mentioned, in connection with the fine entrance porch, that there is a tradition respecting the sculpture in relief on the pediment of the pillars on each side. On the summit of the central part above the doorway, and on some of the later bays (these handsome windows were added by the Reed family), are very peculiar-looking bears, erect on haunch, holding shields, all carved in solid stone, which give a somewhat weird aspect to the sky line. The Heron crest, a heron and an oak, figures above the shield, with the three herons in the centre of the shield. And close upon the steps on each side of the doorway is a sculptured panel to which the tradition refers. That to the right is of original work, a heron in a very conventional oak. That on the left is more recent. The legend says that on the pediment of the pillar on the right hand is represented a heron sitting on its perch, a tree or bush, in its usual haunt, symbolizing the prosperous times of the Heron family. On the left hand the sculpture is evidently of later date, the bird being more rudely carved; and it is represented as charging through a boundary fence, with the broken branches falling around it. This symbolized the approaching downfall of the ancient family of the Herons of Chipchase, and the last owner of that name is said to have caused it to be sculptured before he parted with the last ancestral acres; in accordance with the local prophecy that when a heron should be seen dashing through a fence, instead of flying over it, it would prove a bad omen to the Heron family, whose extinction would then be close at hand. The tradition of the district adds that the last Heron of Chipchase sold the portion of his estate by the margin of the beautiful river, long after he had disposed of all the rest. It is assigned as a reason for his clinging to the river bank that he was an accomplished disciple of "Izaac Walton," exceedingly fond of the noble sport of salmon fishing, and therefore kept his piscatorial rights to the last. When, he perceived that the fatal crisis and the evil day could no longer be postponed, he had the heron re-sculptured on the left panel of the entrance porch to represent the bird dashing through fence after fence, even as he had parted with field after field, to the total alienation of his estate.

Looking at this more recent sculpture itself, perhaps, as it has been suggested, it requires strong faith to believe the bird there figured to be a heron at all. It seems, indeed, to be disporting itself above an heraldic wreath among reeds or some aquatic plants. Possibly, if such be the case, there is, Mr. Longstaffe supposes, some allusion to the transfer of the estate from the last of the Heron family, after a brief interval, to the Reed family. If the *heron* is really meant, it may be regarded as abandoning its perch to the *reeds*. It must be remembered, however, that an Allgood intervened as the owner of Chipchase, but the Allgoods intermarried with the family of Reed, as the monuments in the chapel still bear witness. There is a local prophecy that the Heron family will return to their ancient seat when the herons shall again resort to their old homes. If the right hand panel represented the Herons in their "up lifted" condition of prosperity, it has been asked, might not the other panel represent that they have descended to their feeding-places to gather strength for another rise, when the time of adversity is ended.

It might be thought that many other traditions, supernatural and otherwise, connected with the old historic tower of Chipchase, ought to cluster around the grey time-worn building, which bore the brunt of Border foray and Scottish invasion for so many centuries. Though there is no ghostly visitant, like "the White Lady of Blenkinsopp," to vainly endeavour to guide mortals to the treasure she took so much pains to hide in her lifetime; yet there is one legendary story at least connected with the ruinous Pele-tower, similar to that of the Mother and Child of Chillingham Castle. It tells of an unfortunate knight, Sir Reginald Fitz-Urse, who, being forgotten by the lord of the castle and his retainers, perhaps intentionally, as was not uncommon in these barbarous times, perished by starvation in one of the dark prison-chambers of the great Keep. For hundreds of years, it is said, the ill-fated Sir Reginald has "re-visited the glimpses of the moon," and the scene of his own miserable end; revenging himself first on his cruel captors, and then on their successors, by haunting the old Pele, where the startled passer-by may yet sometimes hear the clang of armour mingled with groanings of a dying man, issuing from its dreary recesses at the weird midnight hour.*

As with most of the ancient Border Towers and Abbeys, there is here a popular tradition of an underground passage, or secret mode of egress from the castle, which, in this case, seems to be founded on fact. A low subterranean way has been traced from the level of the present cellar for a considerable distance southwards, beneath the carriage-drive at the front, and leading towards the site of the ancient village of Chipchase. This is the traditional direction which recent research has quite lately verified. In case of siege, (though the Pele-tower is said to have been twice besieged, but never taken), such a mode of

* There is another legend, which has just been told to me, of similar tragical import. It relates that a knight or warrior, whose name is now unknown, met a violent death in one of the intramural chambers, where he had vainly sought refuge from the murderous band who were pursuing him. The cause of their deadly enmity is likewise unknown.

egress would be most desirable, and would certainly be resorted to on extreme occasions.

It may be added that Edward I., (the greatest of the Plantagenets, perhaps of all our kings,) on one of his journeys into Scotland, is traditionally said to have remained at Chipchase Castle for one or two nights. If he did so, it must have been on his way northwards into Scotland, on the same occasion as that on which he heard Mass at the head of the vale of North Tyne, above Keilder, in the "Bell Chapel," which is now entirely demolished.

The scene of the popular story of the "Long Pack," formerly so well known and often reprinted, as a "chap-book" indispensable to the wandering peddler of the North of England, is, by tradition, laid at Chipchase, although Lee Hall, near Bellingham, is also supposed to have been the place where the tragical incident happened, which James Hogg, the famous Ettrick Shepherd, took for the foundation of his tale.*

These notes, on the history and architecture of one of the most interesting and beautiful of Northumbrian Castles, might have been greatly extended. They were strung together to form a slight memento of the Meeting of the Field Club at Chipchase in July last, and on a former occasion, in 1867, when the pleasure derived from our visits to Chipchase Castle was much enhanced by the presence of our fellow-member, the esteemed proprietor, and by his munificent hospitality. Mr. Taylor has laid the Club under further obligations by his kindness in presenting an excellent engraving to accompany the present memoir.

* Swinburne Castle has also been mentioned, but without similar authority on which to rest its claims to be the place where the intending burglar, secreted in a great bale or peddler's pack, and then left by his comrades in the house, was accidentally shot by an idiot lad, and the deeply-laid plot thus frustrated.

XX.—*On Anthracosaurus Russelli, Huxley.* By Thos. Atthey. With four Plates by William Dinning.

In the "Quart. Journ. Geol. Soc.," 1863, Vol. XIX., p. 56, Prof. Huxley has described and figured the palatal aspect of the skull of *Anthracosaurus Russelli* from the Lanarkshire Coal-field, twelve miles east of Glasgow.

In the "Annals and Magazine of Natural History," September, 1869, there is a description of a large portion of another cranium and the anterior extremity of a mandibular ramus, together with a large sternal plate, of this powerful Labyrinthodont, from Newsham, Northumberland.*

Also, in the February number (1871) of the "Annals," there appear a description and figure of a considerable portion of a mandibular ramus of the same animal, from the new ironstone shale of Fenton, Staffordshire, by my late lamented friend Mr. Albany Hancock and myself.*

In the present communication I propose to describe and figure the upper and under surfaces of the cranium, the right and left rami of the mandible, the teeth with microscopic sections of the same, several ribs and vertebræ, one bone of an extremity, and some scutes, all belonging to one and the same *Anthracosaurus*, obtained about two years ago from the black shale overlying the Low-Main seam of coal at Newsham, near Blyth, Northumberland, by one of the workmen, of whom it was purchased through Mr. T. P. Barkas, of this town. It was in a very rough state and much broken when it came into my hands, and has required for the redevelopment of its principal features an amount of minute work, care, and time that can be appreciated only by those who have been engaged in similar undertakings.

Further, there are certain things here to be mentioned as still obscuring or hiding more or less the upper surface of the skull. First, there is a crack or fissure across the anterior end, a short way behind the snout, through the nasal bones, and lying over the position of the great palatine teeth; secondly, the anterior end of the left ramus of the mandible lies transversely across

* Trans. Tyneside Nat. Field Club, Vol. III., p. 313; and Vol. IV., p. 385.

portions of the jugal, supratemporal, quadrate-jugal, squamous, and parietal bones of the right side of the cranium; thirdly, in the left side of the cranium has been imbedded a small vertebra, probably of the neck (this vertebra seems to have been thrust forcibly in between the bones of the upper wall and those of the floor of the cranium); fourthly, the posterior part of the left palate-bone overlies, on the same side, parts of the jugal, quadrate-jugal, and supratemporal bones. The rest of the upper surface of the skull is uncovered, and can be well seen.

The skull of Anthracosaurus is much broader in proportion to its length, and altogether stronger, than that of *Loxomma;* and both of these are much larger and stronger than that of *Pteroplax,* these three being the only large Labyrinthodonts as yet found in our Coal-field.

The upper surface of the skull of Anthracosaurus is represented in Plate VI. It is broadly triangular, with rounded anterior and posterior angles, deeply concave between the posterior angles, and slightly convex on the sides. It is not quite perfect. Its right side or border, however, is so; whilst from its left side the maxillary bone has been displaced, and was found imbedded in the same slab of shale at a short distance from its proper position in the skull. Further, a portion, about an inch in breadth and three inches in length of the inner posterior border of the right maxillary extension, and an inch of the posterior angle of the same extension of the left side, are deficient. Moreover, the right and left angles of the occiput are also slightly deficient.

The length of the skull along the median line, from the tip of the snout to the posterior edge of the occiput, is thirteen inches and a half, and from the same point to the ends of the maxillary prolongations seventeen inches. The greatest breadth, fourteen inches, is at one inch and a half in front of the ends of these prolongations. Over the posterior ends of the orbital vacuities the breadth is twelve inches, over the anterior ends of the same ten inches and a quarter, and at three inches behind the snout five inches and three-quarters, inclusive of the breadth of the left maxillary bone, which at this part is absent, but has been estimated at the same breadth as that of the right maxilla.

The pitted sculpturing on the surface of the bones is more irregular and more closely crowded about the snout than it is on the skull of *Loxomma;* and it is rougher and deeper on the anterior than on the posterior region of the cranium. The surface altogether has a rougher appearance than in *Loxomma.* No glandular openings have been discovered at the bottoms of the pits or hollows, such as are found in the corresponding parts of *Loxomma,* this discrepancy pointing very probably to some as yet unrecognized difference in the state of the integument in these animals.

The nostrils are openings of about half an inch diameter, and slightly oval in outline. They are bounded in front by the premaxillaries, internally by the nasals, externally and posteriorly by the maxillaries. They are two inches and a half apart; and a line drawn across the nasal region between the middles of their internal margins is one inch behind the mid point of the snout. They are only half an inch distant from the margin of the jaw, and are placed much further forward than the nostrils of *Loxomma.*

The mucus-grooves are two pairs. The anterior pair run backwards and inwards along the inner side of the naso-lacrymal suture as far as the posterior margins of the nasals; the posterior are deeper, and appear in two disconnected portions along the outer margins of the jugal and quadrate-jugal bones. The anterior pair of grooves are less deep and less distinct than those of *Loxomma;* the posterior are deeper, wider, and rougher than those of that Labyrinthodont. In *Anthracosaurus* there is only one pair of mucus-grooves in front, instead of two pairs as in *Loxomma;* whilst in the former only these posterior grooves exist. In *Anthracosaurus* the anterior grooves lie, as far as can be seen, entirely on the nasals; in *Loxomma* the anterior grooves lie nearly altogether on the premaxillaries, and the posterior on the maxillary and lacrymal bones.

The orbital vacuities, broader in front than behind (in fact, somewhat heart-shaped), are placed eight inches and three-quarters behind the snout, are two inches long, and one inch and three-quarters broad; at their anterior margins are two concavities, the inner rather smaller than the outer, having a sharp prominence between them; this with a similar but smaller projection at the posterior margin of the vacuity, seen best on the right side, shows where the ligament bounding the true orbit on the outer side had been attached.

The inner margin of each orbital vacuity is slightly arched, the concavity looking outwards; the outer margin is also arched, and looks inwards and slightly forwards. These end posteriorly in a small concavity, the inner extremity of which, coming forwards, joins the inner margin of the vacuity, forming with it the posterior projection above mentioned.

The true orbit and the rest of the vacuity are very much smaller, and placed further back than in *Loxomma*. The eye, therefore, of *Anthracosaurus* must have been very much less than that of *Loxomma;* the part of the vacuity not occupied by the eye points outwards instead of forwards.

The floors of the orbital vacuities being deficient, they appear like two perforations of the cranium, the inner side of the left and the outer side of the right one having portions of bone only partially filling them up, Plate VI., fig. 1, *O.V.* These portions are parts broken off from the pterygoid bones, which, as can best be seen on the under surface of the skull, Plate VII., *O.V.*, formed originally the floors of the orbital vacuities.

The parietal foramen is distinct; and the channels leading to the external auditory openings are also well defined, especially on the left side.

The premaxillaries are very strong bones, but of small size, measuring from front to back, on the median line, on which they are firmly united, only one inch. Their anterior borders, slightly arched, form the rounded snout. From side to side, along their anterior margins, they measure three inches. On each side they articulate behind with a small part of the maxilla, and form the anterior concave border of the nasal orifices. Between these parts they are bounded entirely by the nasal bones, indenting them deeply on each side of the middle line.

The maxillaries occupy the margins of the upper jaw behind the premaxillaries, and are very long, eleven inches and a half, very narrow, and of small vertical extent. They articulate with the premaxillaries in front, and form the outer posterior margins of the nasal orifices. Their inner margins articulate anteriorly for a short distance with the nasals, then for three inches with the lacrymals, afterwards for six inches and three-quarters with the jugals, and, lastly, by three-quarters of an inch posteriorly with the quadrate-jugals.

The nasals lie immediately behind the premaxillaries and before the frontals; they are much broader in front than behind, and occupy the whole space between the nasal orifices, of which they close the inner and posterior margins; they are bounded on their outer sides by the maxillaries for an inch, and next by the lacrymals for four inches.

The lacrymals are of an elongated pear-shape, the point in front, occupying the angles left by the maxillaries and nasals. They are bounded by the nasals internally, by the prefrontals posteriorly, and by the maxillaries and jugals externally. They do not enter into the formation of the orbital vacuities, as in *Loxomma;* the prefrontals intervene, separating them by a considerable space from those vacuities, and forming nearly the whole of the anterior borders of the latter.

The frontals, a little longer and narrower than the nasals, are broader before than behind, united in front to the nasals, behind to the parietals, and, by the straight median suture, to each other. Their outer margins are articulated to the prefrontals for three-fourths of their length, and to the postfrontals for the remaining posterior fourth.

The prefrontals are much broader than the frontals, by which they are bounded along the whole of their inner borders; the lacrymals bound them in front, and the jugals on their outer borders; they rest upon the postfrontals behind by spaces not greater than two-tenths of an inch. The remaining parts of their posterior borders form three-fourths of the anterior margins of the orbital vacuities, including the greater part of the two marginal concavities already noticed.

The postfrontals, rather shorter and much narrower than the last, which they join in front by a long process, articulate by their inner edges for equal distances with the frontals and parietals. Their anterior and outer borders form one inch and six-tenths of the posterior inner borders of the orbital vacuities, including the posterior marginal prominence above mentioned. They are bounded externally by the postorbitals and a small portion of the supratemporals, and behind by the squamous bones.

The squamous, of an irregularly square form, somewhat concave internally and convex externally, are bounded internally by the parietals, anteriorly by the postfrontals, externally by the supratemporals, and posteriorly by the epiotics and a small portion of the so-called supraoccipitals. Their posterior outer angles contribute the curved inner border of the channels leading to the internal ears.

The postorbitals are also of a somewhat irregularly square outline, and their anterior borders form one inch of the posterior and outer concave margins of the orbital vacuities. They are united internally to the postfrontals, externally to the jugals, and behind to the supratemporals.

The jugals form large irregular triangles, the bases of which lie along the maxilla, the truncated apices supplying about an inch of the outer margins of the orbital vacuities, the posterior angles being cut off by the quadrate-jugals. They are seven inches and a half in length, articulating anteriorly and internally with the lacrymals and prefrontals, internally and posteriorly with the postorbitals, the supratemporals, and, lastly, with the quadrate-jugal bones.

The supratemporals, of irregularly elongated form, lying obliquely between the jugal and quadrate bones, and with them constituting a good part of the lateral extensions of the cranium, articulate anteriorly and internally with the postorbitals, externally with the jugals and quadrate-jugals; posteriorly they overlap and articulate with the quadrates, and on their inner sides join, first, the postfrontals, and afterwards the squamous. It may be noticed that, although the matrix is entirely cleared away from both the upper and under surfaces of these bones, there is no indication of a supratemporal foramen, which is said by Professor Huxley to exist.

The quadrate-jugals, of somewhat rhomboidal outline, lie on the outer convex side of the maxillary extensions, of which they furnish four inches and a half. The posterior extremities of these bones are peculiar. They are bounded by two lines, meeting together at an obtuse angle looking backwards: the outer line begins at a tubercle on the outer border, and runs backwards and inwards; the inner runs from the angle directly inwards, and ends against the quadrate; it is the margin of a rough space which forms the anterior boundary of a fissure that extends down through the bone, and at the underside of the cranium is seen to divide the condyle into two parts; one (the larger) on the under surface of the quadrate-jugal, the other (the lesser) on the corresponding part of the quadrate bone. On the upper surface of the cranium the fissure separates, at that part, the quadrate-jugal from the quadrate. It was, perhaps, filled with cartilage in the living state.

The quadrate bones are both imperfect, somewhat narrow, being one inch and a half across on their upper surface, but broader below, and elongated, lying along the inner margins of the lateral cranial or maxillary extensions, of which, with the quadrate-jugal, they form the blunt extremity that overhangs the condyle for the articulation of the mandible; of the end of the extensions the quadrate forms two-thirds, and the quadrate-jugal one-third. The inner ends of the quadrate bones articulate with the squamous and the epiotics. The bone of the right was five inches and a quarter in length; for the space of an inch of the anterior and one of an inch and a quarter of the posterior end have been preserved, and remain *in situ*, whilst between these pieces the bone is deficient. What remains of the bone of the left side measures three inches in length and one inch and a half in breadth. The posterior margin is thin and free; and the anterior articulates with the supratemporal. The upper surfaces of the bones have each a longitudinal ridge, in front of which are the channels leading to the auditory openings.

The parietals form together an ovoid or subcircular figure, broad behind, flattened and somewhat more pointed in front. They lie immediately behind the frontals, to which they are united by suture; externally they join the postfrontals and the squamous, and behind the so-called supraoccipitals. The parietal foramen, one-eighth of an inch in diameter, lies at about an equal distance from the anterior and posterior borders of the bones.

The so-called supraoccipitals are about twice as broad as they are long, united on the median line, bounded by the parietals in front, by the squamous and then the epiotics externally, by the true occipitals beneath the posterior border of the cranium; and they form, with the epiotics, the posterior concave border of the occiput.

The epiotics, somewhat rhomboidal, with the posterior external angles produced backwards and outwards, forming the external angles of the true cranium, and broader than long, are sutured in front to the squamous, internally to the so-called supraoccipitals, and externally for a third of their length to the quadrates, the outer two-thirds being free. Behind and beneath they are united by suture to the upper surface of the occipitals. A small portion of the outer and posterior margins of each of these bones is wanting, having been broken off.

I have not ventured to mark out, even by dotted lines, what I consider to have been the original outline of these parts.

Under surface of the skull (Plate VII.).—This entire surface, excepting the premaxillary part, has suffered great vertical depression. The median suture, uniting the premaxillaries, is distinct, and is seen to be continued further back between, first the vomers and then the pterygoids. On the right side of the median line the palate is nearly perfect; on the left, the maxillary bone is wanting. Nearly the whole of the præmaxilla, the nasal channel, the entire palatal tooth, a portion of the palate-bone, and the corresponding part of the maxilla of the right side are unfortunately covered by the angular bone of the right mandible, which has been thrown obliquely along that part of the inferior surface of the cranium.

The above parts are all exposed and well seen on the left side. Besides this, the posterior piece of the left palate-bone, which bears a series of small teeth, has been shifted from its natural position, and lies on the posterior part of the upper surface of the same side of the cranium, as was noticed in the description of the upper cranial surface.

Owing to the absence of this portion of the palate-bone, with a portion of the corresponding pterygoid, from its natural site, a portion of the left orbital vacuity can be seen through from below; also the under surfaces of the lacrymal, prefrontal, and jugal bones can be seen united by their sutures. On the right side, a good many of the posterior teeth of the maxilla are *in situ*, and parallel to them are seen the teeth of the posterior division of the palate-bone. On this side, also, a small portion of the orbital vacuity is seen through from below, and the under surface of its inner margin is well defined.

The supratemporal arch of the right side shows part of the under surface of the supratemporal and the whole of that of the quadrate-jugal bone, the sutures of which are nearly all, on both sides, determinable. That portion of the surface of the vomer and pterygoid bones which has been preserved is covered all over with small, pointed, and closely-set tubercles, while, on the other hand, the palate-bones are deeply pitted.

The general surface of the palate has been disrupted along the median line by the pressure to which the skull has been subjected, thus leaving exposed the greater part of the sphenoid and presphenoid bones, the fissures extending forwards from the junction of the sphenoid with the presphenoid to a point a little in advance of the position of the palatal tusks.

The palatine foramen found in *Archegosaurus*, *Trematosaurus*, *Mastodonsaurus*, etc., is altogether wanting in *Anthracosaurus*, and also in *Loxomma*.

The premaxillaries are strong, and the bone on the left side is well preserved, showing three teeth, all broken off at their apices. The tooth (or, rather, what remains of it) that is next to the symphysis, and the third from it, are each four-tenths of an inch long; the second is two-tenths of an inch; they are equidistant from each other. The right premaxillary teeth are hidden by the posterior part of the right mandible lying over them. The teeth, when entire, could not have measured more than six-tenths of an inch in length.

In another præmaxilla in my possession, a little smaller than the above, there are five teeth closely set together. The first three are half an inch in length; the two external or posterior are much less.

The premaxillaries are sutured behind transversely to the vomers. They are said by Professor Huxley "to send back from their opposed ends two processes which run upwards and backwards in the middle line (in the manner common in Amphibia) towards the junction of the vomers." These processes do not exist in the above specimen.

The vomers bear no teeth; their surfaces, when well preserved, are seen to be covered all over by small pointed tubercles. They are normally united by suture on the median line; but in Plate VII. they are represented as having been forced asunder by the crushing of the skull. They articulate by suture, in front, with the premaxillaries, and externally with the palate-bones. Near the base of the great palatine tusk, they form the inner arched sides of the nasal channels. Internal to the tusks the vomers are very narrow, but further back expand a good deal outwards, being all along joined to the inner edges of the palate-bones. They are united behind, next the median line, with the pterygoids.

The nasal channels are directed from the external orifices inwards and backwards towards the median line; for two inches of their course they are well defined, and measure half an inch in breadth. They are bounded internally by the vomers, and behind by the palate-bones. Their upper surface is formed by the nasals; and they appear open below, but would doubtless be closed in during life by membrane, cartilage, or bone. One of these openings is noticed by Professor Huxley, in "Quart. Journ. Geol. Soc." Vol. XIX. p. 59, fig. 1, 1863, as the anterior palatine foramen.

In the plates annexed to the Report of the Committee of the British Association on the Structure and Classification of the Labyrinthodonts, 1874, namely, in Plate IV., fig. 2 (*Mastodonsaurus*), Plate IV., fig. 4 (*Trematosaurus*), and Plate VI., fig. 4 (*Archegosaurus*), the posterior nares are indicated at a short distance behind the external nasal orifices, internal to and very near the outer margin of the cranium, though internal to the maxillary bone; whereas in *Anthracosaurus* the channel from the external nasal orifices leads inwards and backwards towards the middle line, and appears to have been carried further backwards under the pterygoids to near the posterior end of the presphenoid.

The large palatine foramen of the above-named Labyrinthodonts does not exist, as already noticed, in *Anthracosaurus*.

With respect, however, to the backward position of the nares, it may be as well to leave this for the present an open question, until a specimen is found with the bones of the under surface of the skull better disposed for advantageous observation. With all the respect due to the opinion of so learned and skilful a palæontologist as Professor Huxley, my humble opinion is that the posterior nares will be found as far back as the posterior end of the presphenoid.

Indeed, I may add that I have a very interesting specimen, comprising the whole of the right nasal bone of *Anthracosaurus*, showing both the upper and under surfaces, and measuring four inches in length. The external angle of its anterior end shows a part of the margin of the external nasal orifice; and the roof of the channel leading inwards and backwards from it is distinctly visible along the whole length of the bone. Now, as no opening exists on the under surface of the roof of the mouth, the nasal channel must be continued on to the back of the palate.

The right maxilla is narrow and eleven inches and a half long, and extends from the præmaxilla to two inches and a half from the posterior angle of the quadrate-jugal. It bears fifteen teeth. For three inches at the anterior end there are no teeth visible, owing to the right ramus of the mandible lying over them. Behind this space the position of six teeth can be made out; they are two-tenths of an inch apart, and are all broken, but project nearly through the mandible, having been forced into it. The other nine teeth are all about half an inch in length, a little worn at their apices, and placed at irregular distances.

The left maxilla.—The same force which separated and displaced the rami of the mandible has also transferred this maxillary bone to the right margin of the skull, on which it lies imbedded in the matrix, with its anterior end overlying for a short distance the posterior upper border of the right mandible. Ten and a half inches of its inner surface are exposed; and about an inch of its anterior end is wanting. It contains twenty-eight teeth, nearly all entire, and about half an inch long. They decrease slightly in length backwards, and are irregularly disposed in the jaw.

The palate-bones are about nine inches long; a transverse suture divides each into two nearly equal parts. The anterior borders of the foremost pieces form the posterior margins of the channels leading from the external nasal orifices, and are bounded internally by the vomers, and externally by the maxillaries. These anterior pieces have implanted in them the large palatine tusks: that on the right side is covered, as before noticed, by the angular bone of the right mandible; and that on the left side is broken off at six-tenths of an inch above its large expanded base, and is six-tenths of an inch thick. Behind this, on each side, is a large depression nearly an inch in diameter, analogous to that existing in the vomerine bones of *Loxomma.*

These depressions have been noticed by Professor Huxley ("Quart. Journ. Geol. Soc.," Vol. XIX., p. 58, 1863), as the posterior nares. The posterior pieces or halves of the palate-bone, four inches and a half long, with an average breadth of one inch, are sutured inwardly and backwardly to the pterygoids and outwardly to the maxillaries. At an inch behind the transverse palatine suture is a deep depression, one inch long by half an inch broad, at a short distance behind which the outer margin of the bone is raised up into an alveolus one inch and a quarter long, containing seven closely-set teeth. The first, fifth, sixth, and seventh are all broken off at their apices; the second, third, and fourth are perfect, and measure half an inch in length. The last inch of the bone bears no teeth. The whole surface of the palate-bones is deeply pitted, instead of being tuberculated like the vomers, as has already been said.

In another specimen of the anterior portion of the palate-bone of *Anthracosaurus*, in my cabinet, two large palatal teeth or tusks are developed. One occupies the position of the tusk shown in the figured specimen; the other springs, as it were, from the depression behind it. In the specimen figured, the posterior tooth has been shed; and the depression shows the position it had once occupied.

Since the paper on *Loxomma* appeared, I have met with a similar occurrence of two teeth in the right vomer of that Labyrinthodont.

The pterygoids are long bones united in front to the vomers; and if the skull had not been so severely crushed, they would probably have been seen united by suture along nearly the whole of their inner margins. As it is, they have been dislocated; and their well-preserved margins can be observed pressed up to the level of the upper edge of the presphenoid, which projects between them on the median line. By their outer borders they articulate with the palate and jugal bones; and their posterior margins form the anterior and inner borders of the supratemporal arches.

From under the inner margins of the above pieces, which have been widely separated, there curves inwards and backwards, on each side, a short strong piece of bone, which ends in a truncated extremity that is somewhat concave. These bones are very distinct, difficult of determination, and may have been for muscular attachment or osseous articulation. Their ends are parallel with the suture connecting the pre- with the basisphenoid.

The presphenoid is a long narrow ridge of bone on the median line, extending forwards from the anterior end of the basisphenoid, to which it is united by a transverse suture for seven inches. It is articulated above to the under surfaces of the nasals and frontals; from the posterior end of the upper border, one inch and a half in depth, an ascending process on each side passes up to the under surface of the parietals. Its inferior margin is, for two inches posteriorly, rounded off; it is there nearly half an inch in width; and the anterior end of the bone is one-tenth of an inch in width. At the distance of half an inch from its posterior end the bone is fractured longitudinally for two inches and three-quarters. At three-quarters of an inch from its upper border, the lower half inch is pressed up above the upper. The two halves, when united, are one inch and a quarter in depth. The bone at this fracture measures three-tenths of an inch in breadth. For two inches in front of the fracture the presphenoid is perfect, and is one inch in depth; and from this point to the anterior end it rapidly diminishes to one-tenth of an inch in depth, as above stated.

The supratemporal or pterygoid arches, as seen from below, are two inches and a half in length, by about three inches in width, bounded anteriorly and internally by the pterygoids, externally by the quadrate-jugal, and posteriorly by the quadrates.

The basisphenoid is united in front to the posterior margin of the median ridge or presphenoid, and behind by a transverse suture, to the apex of the basioccipital. Its outer borders are difficult of definition, owing to the crushed state of the bones.

At three-tenths of an inch behind the anterior margin of the bone there is an oblique projection on each side of the middle line; these are half an inch apart at their anterior, and one inch and two-tenths at their posterior ends; and each is six-tenths of an inch long. A well-defined smooth and deep groove or channel runs along the inner sides of their bases from before backwards.

The basioccipital is two inches and a half long by one inch and three-quarters broad at its posterior part, and half an inch at its apex. It is articulated in front to the basisphenoid, and on each side apparently to the quadrate bone. The deep cavity behind for articulation to the body of the first cervical vertebra is broken off obliquely near to its posterior margin; and the anterior part which remains is much compressed.

The occipital surface is one inch and one-tenth in depth from the posterior borders of the so-called supraoccipitals or top of the skull to the lower border of the basioccipital. On the left side of the median suture the bones are entire to near the outer margin or angle of the exoccipital; on the right side part of the exoccipital is broken obliquely off, together with a part of the epiotic and basioccipital, exposing to view the sutures connecting these bones. The bone which I believe to be the true supraoccipital is slightly overhung above and near to the median line by the so-called supraoccipitals of Von Meyer, and next by a small portion of the epiotics: it is united below to the exoccipitals, but its outline is not clear.

The exoccipitals, united to each other on the median line, form the sides and upper margin of the foramen magnum. They unite above, first to the supraoccipital, further out to the epiotics, and below to the basioccipital. This forms the lower border of the foramen magnum; its lower border is broken off below, as before noticed.

The mandible.—Both rami are well preserved, and have been separated from each other at the small loose symphysis, probably in consequence of decomposition having been in an advanced stage before the animal was finally enclosed in the mud and its position fixed.

The right ramus has been turned completely round, so that its anterior end lies upon the posterior part of the right side, and its posterior end upon the anterior part of the same side of the cranium.

The left ramus has also been moved from its normal position to the right side of the cranium.

The symphysis of the mandible measures only three-quarters of an inch in depth, and nearly half an inch in breadth; it is small in proportion to the size and strength of the jaw.

The mandibular ramus of *Anthracosaurus* consists of four elements, viz., the dentary, the articular, the angular, and the splenial.

First, the dentary, bearing the teeth, is long and narrow, extending for nearly two-thirds of the length of the ramus; its anterior end, which is attenuated, forms one half of the symphysis; its posterior, much broader, joins with the articular piece; by its inferior edge it articulates with the splenial posteriorly and with the angular anteriorly. Its surface is covered all over with closely set and pointed tubercles.

Second, the articular, the most massive piece of the ramus, is united to the dentary in front; from its upper margin arises a low, rather rounded, coronoid process, and from its upper and posterior part the articular process, bearing the glenoid cavity for the reception of the condyle of the cranium. This cavity is supported by the descending process, which forms the posterior edge of the ramus, and articulates below by a broad surface with the angular piece. The articular cavity faces upwards and somewhat inwards and forwards; it measures two inches and a quarter in length, an inch in width, and two-tenths of an inch in depth. Its neck is strong and devoid of postarticular processes.

Third, the angular. This, from its suture with the articular, extends along to the anterior end of the ramus, forming its lower border and the remaining half of the symphysis. It articulates by its upper edge with the splenial behind and at about the middle of its length, and with the dentary in front.

Fourth, the splenial. This lies along a great part of the inner surface of the ramus, attached along the upper edge to the articular and the dentary pieces; below, both behind and in front, it is connected with the angular, in conjunction with which it forms two unequal elliptical openings, the anterior much less than the posterior, which during life were filled by membrane; these openings are separated by a long obliquely descending process of the splenial, which articulates with a small upward projection of the angular: thus the splenial has three connexions with the angular piece.

The inner surface of the right ramus of the mandible is represented in Plate VIII. fig. 1, one third of the natural size.

It measures sixteen inches in length, and, at four inches in front of the posterior margin, four inches and three-quarters in breadth. It bears nineteen teeth, nearly all of which are in a good state of preservation. The first in front is half an inch in length; the second and third are a little longer; and the following thirteen are three-quarters of an inch, the last three being somewhat shorter than that.

The teeth succeed each other as follows: the first is a quarter of an inch behind the anterior termination of the ramus, the second an inch and a quarter behind the first; at the same distance from the second are the third and fourth, which are in contact with each other; half an inch behind them are the fifth and sixth, also close together; and these are distant from the seventh seven-tenths of an inch; from this to the eighth is two-tenths of an inch; and there is the same distance between the eighth and the two next (the ninth and tenth), which are also close together; these are two-tenths of an inch apart from the eleventh; the twelfth and thirteenth, likewise in contact, are at the same distance behind the eleventh; at two-tenths of an inch further back are the fourteenth, fifteenth, and sixteenth, at short distances from each other; and at an interval of three-tenths of an inch from the sixteenth are seen the seventeenth, eighteenth, and nineteenth, which are in contact and somewhat smaller than the others; these are placed near the posterior end of the dentary bone, terminating the series.

The outer surface of the left ramus of the mandible is given in Plate VIII. fig. 2. This ramus bears fifteen teeth, nearly all of which have been worked out on their inner surface and are therefore not represented in the figure, their outer surface being covered by the matrix as far as the margin of the alveolar border: portions of six teeth are seen near to the symphysial end on this side, and are irregularly placed. On the inner surface the teeth are more uniformly disposed, and stand out nearly half an inch above the alveolar border, which is very strong and slightly concave from end to end of the ramus. The dentary piece is united below to the angular, which forms the inferior convex border of the ramus from the symphysis to its articulation behind with the articular piece. This, from its union with the angular, curves gently upwards, forming the posterior border of the ramus, and is surmounted by the articular cavity; it sends out backwards no postarticular process.

The coronoid process or rising is broad and elongated, projecting above the level both of the articular cavity and the dentary bone; a deep channel or mucus-groove runs along the inferior margin of the ramus from the anterior to the posterior end of the angular piece; it then curves upwards and forwards for a short space, and ends below the posterior margin of the dentary bone.

The teeth are arranged in a double series (maxillary and palatal) on each side of the upper jaw, and in a single series on each side of the lower jaw. They are of pretty uniform size and shape throughout, excepting the palatal tusks. Those of the mandible are anchylosed externally to the alveolar margin; and a thin lamina of bone, running continuously over their inner sides, invests them as in *Loxomma*. They are, at their bases, oval in outline, the long diameter of the oval being placed transversely to the line of the jaw. Above the alveolar margin they are circular up to near their apices, where a ridge exists on each side, giving the teeth a double edge. They are longitudinally grooved, with flattened ridges between from the alveoli up to near their apices. The whole surface of the teeth is coated with a layer of enamel, which is thickest at the apex.

Vertebræ.—Thirty-six vertebræ were found in connexion with the skull:—first, a small one, which has been pressed in upon the skull between the supratemporal and the pterygoid bones, and belongs probably to the upper part of the neck. The remaining thirty-five are embedded in two separate slabs of shale: the smaller slab shows six vertebræ, all in a connected series; one of these is figured in Plate VIII., fig. 4. The larger slab has twenty-nine vertebræ, also in a connected but contorted series, and lying nearly in their natural order, with their dislocated and broken processes around and several ribs lying beside them.

The vertebræ are alternately large and small, well ossified and preserved; and the anterior and posterior surfaces of their bodies are both somewhat concave.

The bodies are broadly rounded and project downwards; and the space between the anterior and posterior surfaces is concave from side to side, grooved, and pitted in the grooves; the under margin of the body is thicker than the margin bounding the vertebral canal; so that the spinal column at that part must have been convex on its abdominal aspect; moreover the bodies are peculiar in having the upper borders of their anterior surfaces projecting forwards in the form of a ridge, whilst the lower borders of their posterior surfaces project in a similar form downwards. The sides of the bodies are level with each other: no facet is visible on the sides of the vertebral bodies for the articulation of the heads of ribs; but the facet on the transverse process is distinct and large, but is not divisible into an upper and a lower part. The neural canal is remarkably small for the size of the vertebra. The transverse and zygomatic processes and the spinous processes arise, in the specimen figured, from the sides and top of the arch; they are all massive and of considerable size; the transverse processes have a length of one inch and a half, a breadth of nine-tenths of an inch, and a thickness of two-tenths of an inch. The direction of the transverse process is almost directly outwards; that of the anterior pair of zygapophyses, which are rather concave, is upwards and slightly inwards; the posterior face downwards and outwards, and are somewhat smaller than the anterior pair.

The measurements of the small dorsal vertebra (Plate VIII., fig. 4) are as follows (in inches):—

	inch.
Height of body	1·6
Transverse diameter of body	1·6
Length of body	0·6
Height of neural arch	0·3
Height of spinous process from top of neural arch to apex	2·3
Length of ditto	0·6
Thickness of ditto	0·3
Width of transverse process	0·6
Thickness of ditto	0·2
Length of ditto	1·2

The spinous process projects directly upwards and is very thick and strong and somewhat enlarged near the extremity, which is pointed.

Ribs.—Upwards of twenty ribs were found associated with the skull and vertebræ; a great many of these are perfect. The largest is nine inches long, by a little more than half an inch in breadth, and is well and regularly arched. The curve of the bone is continued as far as the head, which ends in a concave, transversely oval, undivided, articular surface; the tubercle is seven tenths of an inch external to the head, is large, standing well out from the posterior or convex surface, and has a similar concave articular surface to that of the head. A broad groove runs along the inner and under surface of the rib from between the head and the tubercle for about two-thirds of the length of the rib towards the sternal end. The upper border of the rib is convex, tending to a ridge approaching the tubercle. The sternal end of the rib is flattened above and below, and presents an oval concavity to receive the corresponding costal cartilage.

Scutes.—About thirty scutes have been found scattered about in the matrix in close proximity to the skull; the largest group consists of six, which are in contact with each other, but not in their normal relative position. They vary from two inches and a half to one inch and three-quarters in length, and are nearly three-quarters of an inch in breadth at their anterior ends, which are slightly rounded, and half an inch at their opposite ends, which are obtusely pointed. Their upper surfaces are slightly convex, and their under surfaces concave or spoon-shaped for the anterior half of their length, the posterior half being convex; both their right and left margins are very thin (Plate VI. figs. 2 and 3).

One bone of a limb.—This is large, and most probably a femur. It lies on the left side and at the posterior end of the large series of vertebræ, parallel with a part of the chain, and with its upper end resting upon two or three vertebræ, which are deviated to the left and at right angles to the others. The upper end has been broken off obliquely, together with the bones on which it rests. It is four inches in length as it lies; the lower end strongly resembles the lower end of a femur, and has been compressed from side to side. The shaft has been longitudinally broken in upon its cavity, and is therefore irregular; and the upper end or head is entirely wanting.

Plate IX. fig. 1 is a transverse section of a maxillary tooth of *Anthracosaurus*, from a specimen in my collection, other than that figured in the former Plates. It is made at a line a little below the apex and above the top of the pulp-cavity. It is rather more elliptical than circular in outline, having two slight ridges corresponding to the ends of the long diameter; these ridges show the position of the two cutting-edges of the tooth. The dentine pervades the whole area within the enamel, a thickish layer of which encloses the dentine. It does not appear that this part of the tooth has undergone any flattening or other injury.

Fig. 2 is a transverse section a little below fig. 1 and just below the top of the pulp-cavity. The outlines of the tooth and of the pulp-cavity are oval, that of the former broadly so. No coating of enamel is visible, except at one part, where a portion of matrix is adherent to the tooth; a stellate appearance, which strikes the eye at once, arises from the arrangement of fifteen fusiform bodies of light-coloured dentine around the pulp-cavity, radiating from it to the circumference; the internal apices project slightly into the pulp-cavity and give to its outline an undulating appearance; their external and more pointed apices reach quite to the circumference of the tooth, where a narrow peripheral band passes from the outer margin of the tooth directly into each of them, extending for a short distance towards the pulp-cavity. The dentinal tubes of the fusiform bodies all pass into this narrow infolded band, which is dark-coloured, not light as in *Loxomma*. The light-coloured fusiform bodies appear as if imbedded in dentine of a dark colour, which is owing to the tubules of it being black; and this dark dentine is broadest at the periphery of the tooth, in each interval between the spindles. The dentinal tubes in this dark part pass from its middle, radiating outwards towards the periphery of the tooth.

Fig. 3 is a transverse section a little below fig. 2, but still above the termination of the radiations of the pulp-cavity. Its form is more elliptical than that of the former sections; the same radiating fusiform bodies of light-coloured dentine, but of a larger size, are seen, encroaching upon the external darker dentine; the narrow infolded peripheral band runs inwards here for two-thirds of the length of the light-coloured spindles; it is therefore longer, more distinct, and very sinuous.

The dentinal tubes radiate as before from the whole margin of the pulp-cavity into both the light and dark dentine; those passing into the former, after the most beautiful wavy windings, end in the sides of the infolded peripheral band; those of the latter radiate to the periphery. No granular layer of dentine is seen in this section.

Fig. 4 is a transverse section a little below the alveolar border, a portion of which is attached to the section. The tooth has at this part been crushed, and parts of the dentine are here and there displaced; but it can be seen that the full complexity of the tooth is here displayed, and that the cavity is elliptical. The dark dentine of the exterior of the tooth is much less in proportional size than the light. The spindle-shapes of the latter are no longer visible, but are represented by tracts passing in from the dark exterior and folding upon themselves as they pass towards the pulp-cavity, the outline of which is far from distinct, owing to the breakage of the parts around. Into each of these tracts enters, from without, the narrow peripheral band noticed under fig. 3 as being very light-coloured and sinuous. In fig. 4 this narrow band is much more sinuous, and follows the windings or convolutions of the light dentinal tracts to near their extremities, which are frequently continuous with each other; but the infolded narrow tracts are not so, keeping separate. The narrow bands are here dark instead of light in colour, and granular. The folded tracts are here and there separated from each other by clear but irregularly shaped spaces, which are parts of the offsets of the pulp-cavity.

There are, intervening between the commencements of these long winding tracts at the peripheral layer of dentine, others which are very short, rudimentary, and mammillary, projecting into the outer ends of the divisions of the pulp-cavity. These also have a narrow dark band of granular dentine in their interior. The same arrangement occurs in the teeth of *Loxomma*.

The dentinal tubes all radiate from the margins of the central pulp-cavity and its ramifications; most of them pass through the light-coloured dentine of the sinuous tracts, and end in the narrow dark band running through them; those, however, which radiate outwards from the ends of the offsets of the pulp-cavity are spread out in a fan-like expansion, and, after passing through a series of finely-arched lines crossing them, reach the exterior of the tooth.

The teeth of *Anthracosaurus* are, in fact, like those of *Loxomma,* formed of a series of toothlets surrounding the pulp-cavity; the offsets from this are the pulp-cavities of the toothlets; the part between the extremity of the offsets and the exterior of the tooth, consisting of radiating tubules and imbedding dentine, forms the crown of the toothlet; whilst the fangs are formed by the sides of the offset of the pulp-cavity—that is, by one half of a sinuous tract of light dentine, the narrow, dark, granular, infolded band indicating the line of separation between the toothlets, or their line of union, according to the view taken of the matter.

Of these toothlets there are about twenty-four, large and small, together; and their crowns form the ridges seen on the exterior of a tooth.

In *Loxomma* the dentinal tracts or plicæ are much less tortuous than the corresponding parts in *Anthracosaurus;* but the infolded band, which is dark in the latter, is light in the former.

The arrangement of a compound tooth is really the same in both these animals. Enamel is visible; but certainly none is infolded into the plicæ or elsewhere. No cementum is anywhere visible.

In my cabinet, the following separate bones of *Anthracosaurus* from our coal-shale, and not already noticed, occur :—

One right maxilla.—This lies in the matrix with its inner surface exposed, and measures eight inches and a half in length by one inch and a quarter in breadth at three inches and a half behind its anterior end; from this point it diminishes slightly forwards, but much more rapidly backwards. It bears nineteen teeth, all of which are perfect, and, with the exception of the last, measure three-quarters of an inch in length from the base at the alveolar border to the apex. They are oval at their base in the transverse direction of the jaw, in which they are arranged as follows :—The first four are placed at a short distance behind the anterior end, and are in contact with each other; the fifth is two-tenths of an inch behind the fourth, and the like distance in front of the sixth and seventh, which are in contact with each other; two-tenths of an inch separates the seventh from the eighth, which is the same distance in front of the ninth, tenth, eleventh, and twelfth, which are in contact with each other; after an interspace of two-tenths of an inch come the thirteenth and the other six, which are all nearly a quarter of an inch apart from each other. Their surfaces appear to be eroded, which gives to the teeth a ridged appearance. The seventeenth tooth has been extracted; and the microscopic sections represented on Plate IX., figs. 1, 2, 3, 4, were made from it.

One quadrate-jugal bone, in a good state of preservation, showing both its surfaces. The upper surface shows the deep depression or mucus-groove along its outer margin, as figured in Plate VI., fig. 1, also the tubercle with the line from it running inwards and backwards to the fissure which divides into two parts the condyle for articulation with the mandible.

Only about half a dozen isolated teeth of *Anthracosaurus* have been found, which shows how very rare this amphibian is when compared with *Loxomma,* whose teeth are not unfrequently met with.

Vertebræ: six separate ones, and on one small piece of shale there is embedded a quite entire vertebra; there are also four fragments of vertebral processes, some of which are articular.

Ribs: four, in a good state of preservation, showing both head and tubercle, and the remains of two others, one of which shows head and tubercle.

Scutes: in a small piece of shale are imbedded ten, well preserved, but not lying in natural order; and on separate pieces of shale six or eight more.

The scutes of *Anthracosaurus,* Plate VI., figs. 2 and 3, are much like those which, since the publication of the description of *Loxomma,* have occasionally been found in connexion with the remains of the latter; but they have not as yet been identified as belonging to *Loxomma.*

Besides the above osseous remains of *Anthracosaurus,* and lying scattered among the vertebræ, there is a good deal of coprolitic matter, probably from the intestines; and mixed up with it are a palate-tooth, a rib, and several fragments of scales, belonging to *Ctenodus*.

Can it safely be inferred from these accompaniments that *Ctenodus* formed at least a part of the food of *Anthracosaurus*?

Note.—Of the three large Labyrinthodonts as yet found in the Northumberland coal-field, *Anthracosaurus* is by far the largest. The general arrangement of the separate bones which form the upper surface of the cranium is much the same in both *Anthracosaurus* and *Loxomma;* but it differs considerably from that of *Pteroplax,* whose entire cranium, so far as we know from specimens up to the present time obtained, is composed of the bones corresponding to those which form the centre or middle posterior part of the crania of the two former, viz., the frontals, parietals, occipitals, postfrontals, squamous, and epiotics. The posterior lateral expansions, composed of postorbital, supratemporal, quadrate, and quadrate-jugal bones, do not exist in this very interesting amphibian; the premaxillary, maxillary, nasal, and prefrontal bones also, which form the anterior extremity of the cranium, have been broken off, strange to say, from all the three specimens as yet known. *Pteroplax* therefore differs considerably in size, in outline, and in many details from both *Anthracosaurus* and *Loxomma.*

In referring to the description of *Pteroplax,* H. and A., in the "Annals," Ser. 4, Vol. I., Plates XIV. and XV., fig. 2, I find it necessary to correct what now appears erroneous in that paper. The sternal plates, figured and described as belonging to *Pteroplax,* I now think cannot properly be attributed to that animal. That they may have belonged to *Anthracosaurus* or *Loxomma* is more probable; but even that is doubtful. Fig. 3 of Plate XIV., called premaxilla of *Pteroplax,* does not belong to *Pteroplax* at all, but is a premaxilla of *Loxomma Allmanni.* Plate XV., fig. 2 is named as a vertebra of *Pteroplax,* but is in reality a vertebra of *Anthracosaurus;* and in our description of it we noticed its resemblance to the vertebra figured in Quart. Journ. Geol. Soc., Vol. XIX., p. 63, 1863, as that of *Anthracosaurus* by Prof. Huxley.

Three crania of *Pteroplax* (one in the Leeds Museum and two in my cabinet) are all we know as yet of this rare amphibian. On one of these latter lie two ribs which most probably belonged to the same animal. That on the upper surface is entire and much like a rib of *Loxomma*, but smaller; both head and tubercle are well shown: that on the under surface cannot well be described, as it is not sufficiently exposed. All three specimens are from Newsham, near Blyth, Northumberland.

The general configuration of the under surface of the skull is much the same in *Loxomma* and in *Anthracosaurus*, but is very different in *Pteroplax*. The vomers pass much further forward in *Anthracosaurus* than in *Loxomma*. Their anterior margins in the latter are just in front of the vomerine tusks, and are sutured to each other on the median line: by their outer margins they join the maxillaries, and behind the palate-bones; whilst in *Anthracosaurus* the anterior end of the palate-bone lies in between the vomers and the maxillaries. The posterior part of the palate is much the same in *Anthracosaurus* and *Loxomma*, but, so far as I can ascertain, is probably very different in *Pteroplax*.

Whether *Anthracosaurus* possessed epiotic horns like *Loxomma* and *Pteroplax* is not determinable, the specimen being deficient at these parts.

The teeth of *Anthracosaurus* differ much from the teeth of *Loxomma*; they are slightly oval in outline and altogether stronger than the latter, which are much flattened. The teeth of both in section show most beautiful Labyrinthodont structure. The teeth of *Pteroplax* have not as yet been found.

The vertebræ and ribs in *Anthracosaurus* and *Loxomma* are of large size, very strong, and most difficult to distinguish from each other when found separate. None of the vertebræ of *Pteroplax* have ever been discovered.

The drawings which accompany this paper, and also those illustrating the paper on *Loxomma*, are from the accurate pencil of Mr. William Dinning of this town, whose kind assistance is here gladly acknowledged.

EXPLANATION OF THE PLATES.

PLATE VI.

Fig. 1. Upper surface of cranium of *Anthracosaurus Russelli*, one third the natural size; *P.max*, premaxilla: *M.g*, mucus-groove; *A.n.o*, anterior nasal orifice; *N*, nasal bone; *Max*, maxilla; *L*, lacrymal bone; *Ju*, jugal; *Qu.ju*, quadrate-jugal; *Qu*, Quadrate; *S.t*, supra-temporal; *O.V*, orbital vacuities; *Fr*, frontals; *Pr.fr*, prefrontal; *Pt.fr*, postfrontal; *Pt.O*, postorbital; *P*, parietals, with parietal foramen; *Sq.*, squamous; *S.O?*, supraoccipital, so called; *E*, epiotic; *T.F*, temporal fossa; *S.O*, supraoccipital; *E.S*, exoccipital; *Mand*, anterior end of left mandible overlying part of skull; *P.B*, palate-bone, posterior end of right side, displaced.

Fig. 2. Upper, and fig. 3 under, surface of a dermal scute; *a*, anterior end.

PLATE VII.

Under surface of same cranium, one-third the natural size. *P.max*, pre-maxilla; *V*, vomer; *N.C*, nasal channel; *Max*, maxilla; *Pal*, palate-bone; *P.T*, palate-tusk; *P.t.p*, palate-teeth, small posterior series; *O.V*, orbital vacuities; *Pter*, pterygoid-bone; *B.sph*, basi-sphenoid; *Pr.sph*, presphenoid; *Pr.fr*, prefrontal; *L*, lacrymal; *Ju*, jugal; *Qu.ju*, quadrate-jugal; *B.oc*, basioccipital; *Qu*, quad-rate; *Mand*, right ramus of mandible overlying part of right side of skull.

PLATE VIII.

Fig. 1. Inner surface of right mandible of same, one third the natural size. *Ar*, articular piece; *D*, dentary; *S*, splenial; *An*, angular; *Sym*, symphysis.

Fig. 2. Outer surface of left mandible, one third the natural size. *Ar*, articular piece; *D*, dentary; *An*, angular; *M.g*, mucus-groove.

Fig. 3. Dorsal rib, two thirds the natural size.

Fig. 4. Dorsal vertebra, natural size, entire.

PLATE IX.

Sections of Teeth of Anthracosaurus.

Fig. I. Transverse section of maxillary tooth near to apex and above pulp-cavity, magnified 12 diam. *E*, enamel; *D*, dentine.

Fig. 2. Transverse section just below top of pulp-cavity. *E*, thin enamel; *D.l*, light dentine. *D.d*, dark dentine; *P*, pulp-cavity; short infoldings of peripheral bands *(Pl.)* into apices of fusiform light dentine are seen, also rudimentary radiations of pulp-cavity.

Fig. 3. Transverse section a little below fig. 2 and above the radiations of the pulp-cavity, the rudiments of which are indicated as in fig. 2. *D.l*, light dentine; *D.d*, dark dentine; *P*, pulp-cavity, the infolded peripheral bands *(Pl.)* extend inwards two-thirds of the distance towards the pulp-cavity.

Fig. 4. Transverse section a little below the level of the alveolar border. *D.l*, light dentine; *D.d*, dark dentine; *P.* pulp-cavity; *Pl.* peripheral band infolded; *P*, irregular radiations of pulp-cavity.

Fig. 5. Portion of fig. 4, magnified 48 diameters; *t t t*, toothlets; *D.l*, light dentine; *D.d*, dark dentine; *Pl*, peripheral band infolded and sinuous; *P P P*, pulp-cavity.

XXI.—*On the Capercailzie* (*Tetrao Urogallus, Linn.*). By the Right Honourable Earl Ravensworth.

It happens that I have had an opportunity which very few others have enjoyed, of observing and studying the habits and character of this noble species of "*Tetrao*," which Linnæus has distinguished by the specific name of "*Urogallus*."

I proceed therefore to give the results of this experience, in the hope that my statement will not be without interest to the members of the Natural History Society. This bird, originally indigenous in the British Islands, having become extinct, was introduced into the Scottish Highlands some forty years ago by the late Marquis of Breadalbane, at his splendid seat of Taymouth in Perthshire. From thence it has spread all the way down the great Strath of the Tay, and into the adjacent districts of Strath Earn, wherever the extensive forests of Scotch Firs afford it an appropriate asylum. I myself have seen these grand birds in their wild state, and have shot four specimens in the woods of Drummond Castle and Strathallan. From the knowledge thus acquired of their habits, the idea struck me that they might be naturalized in certain localities of Northumberland, and where large tracts of Pine wood exist upon the edge of moors and wild crags, on which flourish many berry bearing plants, such as the blaeberry, crowberry, and others, which supply a favourite food to the kindred species of Blackcock and Grouse.

Extensive woods of Fir and Larch, and undisturbed privacy, nigh to a lofty situation, seem to be the main conditions requisite for the asylum of the *Capercailzie*. These conditions are found in the great woods of Thrunton and Callaly Crags, and the still larger extent within the limits of Hulne Park and Brislee Hill, with the adjacent woods of Roughlee and Burslee, near Eglingham.

I now proceed to describe the ill success that has hitherto frustrated my attempts to turn out these game birds in the neighbourhood of Eslington Park. In the year 1872 we reared three birds, one cock and two hens, from half-a-dozen eggs which I got from Perthshire. They were turned into a young plantation and by some unaccountable accident the male bird was destroyed. Thus we were left with two hens, which in the following spring laid a quantity of eggs in confinement. Of course they were barren, so we had them for breakfast, and very good they were. I dare say the two hens laid fully twenty eggs.

In that year, 1873, we got two more settings of eggs, from which a good many chicks were hatched; but the summer was very wet, and all our young birds perished after arriving nearly to maturity. I may here state that the *Capercailzie* seems very impatient of wet, and in rain they are always accustomed to seek shelter under the thickest trees or the coop in which their foster parents are confined. This seems remarkable, because assuredly in the northern regions where they most abound they must be exposed to a great deal of rain and snow. In 1874 we tried again, and reared to their full growth four fine birds, two of each sex, of which one noble bird still survives quite tame and familiar, having always had his full liberty. Of the rest the cock and one hen died, and the second hen was killed by her mate in the ardour of his advances.

The two original hens had also died, so in 1875 only this one male bird survived, and still continues at full liberty and in perfect health. How long he will so remain I know not, because when the season of courtship returns he becomes so savage that he attacks everybody that comes near, and it is necessary to shut him up in his pen. I really believe he would almost kill a small child, for he is as big and as fierce as an eagle, and can inflict severe wounds with his wings and powerful beak.

Now comes the present year 1876, and last spring out of twenty eggs we hatched fifteen chicks, and reared to maturity three cocks and four hens, making with the single male bird alluded to eight individuals, four males and four females. All these fine birds existed at Eslington during the whole summer, enjoying their full liberty, and in perfect health, till unhappily one of the females thought fit to extend her flight some ten miles towards Wooler, and was shot by the gamekeeper near Lilburn Tower. After this casualty we thought it prudent to confine part of the remaining birds of the year, of which two have since died of some disorder which seems to have been produced from some deficiency in their diet which we were unable to foresee or to provide remedies for.

Thus our present stock is reduced to five individuals, three males and two females, which at present are all in good health.

From this statement it will be manifest that a good deal of bad luck has attended this experiment, in spite of all the care and trouble bestowed upon the rearing of the broods. In the first place, the casual destruction of the male bird in 1872, and secondly the remarkable fact, that not one of the adult birds chose to fly to the particular woods best adapted to their nature, to wit, those of Thrunton and Callaby, though at a distance of little more than a mile in a straight line. On the contrary, they have flown every way but the right one, when it has pleased them to take a long flight, and thus one of the hen birds came to her untimely death.

To summarize in a few words the character of these peculiar birds, it appears full of contradictions. Powerful and robust when arrived at maturity, they are very delicate and difficult to rear when young. Extremely wild and shy in a wild state, and having a well-known tendency to fly great distances, they are the most indolent birds possible, seemingly never caring to move more than a few yards from the spot to which they are familiarized. Of a very courageous nature, I have seen a wild male, when wounded by a gun-shot, instead of running away like a Pheasant, walk defiantly up to the sportsman, in spite of the natural shyness which makes them so very difficult of approach in their native forests. And this fact is worth notice, that their colour assimilates so closely with the tone of the foliage of the Scotch Fir, that few could conceive the difficulty of distinguishing the male bird (of the magnitude of a Turkey) when seated on the branch of a Fir even at a moderate distance. Lastly must be noticed the extreme ferocity of the male and his extraordinary gesticulations during the season of courtship, which makes him a dangerous neighbour to females and children who may be exposed to his attacks.

As the flesh of this species is bad food except perhaps in youth, it may well be asked whether the possession of this species be worth the great care and trouble of rearing them to maturity. Yet every lover of nature will readily sympathize with such efforts, where the local peculiarities may seem to give a fair promise of success.

XXII.—*Miscellaneous Notices and Observations.*

On the Occurrence of the Passenger Pigeon, Columba (*Octopistes*) *migratoria, Linn., in Yorkshire.*—On the 13th of October, 1876, I received a specimen of this North American bird from the Dowager Marchioness of Normanby, who stated in her letter which accompanied the bird, "that it was shot here to-day by Lord Harry Phipps." The bird must therefore have been killed on the 12th, and as her Ladyship's letter is headed Mulgrave Castle, it is clear also that the bird was obtained at Mulgrave, the seat of the Marquis of Normanby. This is the only specimen killed in England that I have seen.

In Dr. Fleming's History of British Animals, p. 145, it is stated that "a Passenger Pigeon, *Columba migratoria, Wil.*, was shot, while perched on a wall in the neighbourhood of a Pigeon house at Westhall, in the parish of Monymeal, Fifeshire, 31st Dec., 1825. The feathers were quite fresh and entire, like those of a wild bird."

With regard to the Mulgrave bird it is very different, for the quill feathers in the wings are much worn and broken, and on the forehead above the bill they are apparently worn off to the skull, as though the bird had been trying to get out of a cage or some other enclosure, therefore I cannot come to any other conclusion than that this specimen, a female, has made its escape from confinement.

If we are to form an opinion of the vast numbers of this bird in its own country, from the account given by Audubon of these Pigeons at one of their roosting places, it must be the most prolific of the feathered tribe ever heard of.

The Mulgrave specimen will shortly be placed in the collection of the Right Honourable Earl Ravensworth.—*John Hancock, 20th November*, 1876.

On the Occurrence of the Eagle Ray (Myliobatis Aquila, Cuv.) off Cullercoats.—A fine specimen of this rare visitant to the British seas was taken on November 5th, 1875, about six miles off Cullercoats, by G. Stocks, a fisherman at that place. The specimen is a female, and is of a rhomboid form, with the head very prominent, and a blunt rounded snout, which gives it very much the appearance of a large toad. The eyes are very prominent on the sides of the head, and there is a deepish hollow between them. The spiracles are placed immediately behind the eyes. The body is thickest just behind the head, and it slopes away to the root of the tail, and also to the sides, and on to the tips of the large pectoral fins, forming a ridge down the centre of the back. The tail is long and whip-like in form, with a serrated spine placed a short way from its root. The large pectoral fins are wing like, and of a triangular form, slightly convex in front and concave behind; they take their rise just behind the eyes, and extend nearly the entire length of the body. The ventral fins are close behind them, and are of a quadrate form, rather longer than wide. The small dorsal fin is placed just in front of the spine on the tail.

The mouth and nostrils, as is usual in the Rays, are on the underside of the fish, the mouth being about an inch and a half from the end of the snout. There are five slits or gill-openings on each side placed considerably behind the mouth. The teeth are flat, and arranged on the jaws like a tessellated pavement, and in transverse rows; the central teeth, which are the largest, are long, narrow, and hexagonal in form, and slightly arched, the smaller teeth are diamond-shaped, and fit in between the ends of the central ones, forming alternately one and two rows at the sides.

The action of these two plates of teeth, palatal and mandibular, on each other, is of a crushing character, something like the action of a millstone, hence one of the local names of the fish is the Miller; and the generic name *Myliobatis* has also reference to this character.

The dimensions of the specimen are as follows. Length from snout to root of tail eleven inches; length of tail, nineteen inches and three-quarters. The serrated spine, which is placed about three inches from the root of the tail, is two inches and three-quarters long. The breadth across the pectoral fins is eighteen inches and a half. The colour is a greenish brown on the back, and white underneath. The fin rays give the fish the appearance of being covered with striæ.

The first account we have of the occurrence of this species in the British Seas is in 1769, and is mentioned by Pennant in his "British Zoology." The next is in 1839, when a specimen was found on the shore at Spittal, near Berwick-upon-Tweed, an account of which is given in the first volume of the Berwickshire Club Transactions, by the late Dr. Johnston.

Couch in his "British Fishes" mentions two or three instances of its occurrence, but they cannot be said to be satisfactory.

The specimen here described is now in the Museum of the Natural History Society.—*Joseph Wright.*

Greenland Shark (*Squalus borealis, Fleming*).—A specimen of this fish was captured at Newbiggin in February, 1876, and was exhibited in a fishmonger's shop in the town. A specimen now in the Museum was captured at the same place in 1868.—*J. W.*

The Ribbon Fish (*Gymnetrus Banksii, Cuv.*).—A fine specimen of this fish was taken off the coast at Amble, opposite Coquet Island, on March 8th, 1876. When it got into shallow water it turned to make out to sea again, but a man who saw it ran into the sea and seized it by the gills, and with some extra help it was dragged on shore. It was stated to have lived for two hours after being landed.

The dimensions of the specimen are as follows. Length, thirteen feet four inches and a half; depth, directly behind the gills, nine inches and three-quarters; in the deepest part, which is nearly to the centre of the fish, fourteen inches and a half; near the tail, six inches and a half. The outline of the fish is a gentle curve along the back from the head to the tail, and the ventral border is comparatively straight. The thickness is about five inches in the thickest part.

The dorsal fin extends the entire length of the fish, and consisted of two hundred and thirty-six rays, connected by a thin delicate membrane about two inches in height. The first ten rays are much longer than the rest and form quite a crest. The front ray was twenty-four inches long and ended in a fine filament, the others were broken, so that their length could not be ascertained. The portions above the membrane being free, would give quite a plume-like appearance to the crest.

The pectoral fins are small and triangular in form, being about two inches wide and two inches long: they consist of eleven rays. They are situated a little behind the opercula, and rather below, and their direction is upwards and backwards. The ventrals, which are just below the pectorals, are very long and spine-like, with a small oval leaf-like expansion at the end: they were four feet in length. One of them was broken off entirely from the fish, and the other was broken through the middle, the end with the expansion being lost. The tail was damaged by lashing on the rocks when the fish was captured. The lateral line begins just above the eye; it then turns down towards the ventral border, which it approaches very closely, and is continued on to the tail. The vent is situated nearly six feet from the end of the snout.

The eye is about one inch and a half in diameter, of a silvery colour; the pupil, which is half an inch in diameter, being black.

The mouth appears capable of being much protruded, and there are no teeth in the jaws. The skin is of a silvery lead colour, much like a piece of lead newly cut. There are a few black bands crossing the sides and inclining from before backwards; these bands quickly disappeared, and after a day or two could scarcely be seen. The dorsal and ventral fins are red.

There are a few ridges running along the sides, being most prominent towards the middle, and when the fish is fresh give rather an angular appearance to it.

There are no scales, but the skin is covered with small bony points.

The silvery matter covering the fish, on being examined with the microscope, is found to consist of granular matter in which minute crystalline bodies are embedded, though I failed to see the scale-like bodies mentioned by Mr. Albany Hancock and Dr. Embleton in their account of the fish captured off Cullercoats in March, 1849, and published in the first volume of the Transactions of the Tyneside Naturalists' Field Club.

The general characters of the specimen just described agree in every particular with that described by Messrs. Hancock and Embleton, and also corroborate their view that the ventral fins were originally much longer in the specimen they examined than was stated by the fishermen.—*J. W.*

On the Voracity of the Eel.—The following account of the voracity of the Eel was given me by Mr. John Laws, who received the specimen from Mr. George Longstaffe, of Eshot, near Felton.

The latter gentleman, whilst walking by the side of Thirston Burn, on May 27th, 1875, had his attention drawn to a large Eel, which seemed to be somewhat in difficulty. On looking at it closely he was struck with the peculiar appearance of the head of the fish, which looked as if it had two antennæ projecting from it. Having his gun with him he fired at the fish and disabled it, and after some little trouble landed it. On examining it he found that the peculiar appearance of the head was caused by the Eel being in the act of swallowing a large Water Vole, and that it had so far succeeded as to leave only the hind limbs and tail sticking out of its mouth. The Eel was about two feet four inches in length.—*J. W.*

The Spinous Shark (*Squalus spinosus, Blainv.*).—An individual of this species was taken in a salmon net, off the mouth of the Tyne, in the month of July, 1876. It was a female, and measured about six feet in length. In its struggles to get free it made sad havoc with the net; the spiny tubercles cutting and tearing it to pieces. The formidable character of the tubercles renders this fish a very dangerous customer to fall in with, and it is perhaps well for fishermen that its habits keep it in deep water, and near the bottom; though, from the few specimens that have been obtained, but little is known about its habits. About half a dozen specimens only are recorded as having been got on the British coasts, and two of them are from the mouth of the Tyne. One was obtained in 1869, and is now in the Museum of the Natural History Society, and the other the subject of this notice.—*J. W.*

Rorqual.—About the middle of September, 1876, a large Whale was found dead, floating in the sea, about twenty miles to the N.E. of Coquet Island. It was taken in tow by a steamer and brought into Shields Harbour, and there exhibited for a short time. It was afterwards towed up the Tyne and moored between two keels opposite the Javel Group for exhibition.

On the 26th of September I saw the huge animal; it was lying with the belly uppermost, and the peculiar plaits or folds on the throat and breast, so characteristic of the Rorquals, were thus easily seen. As much of the animal was below the water, and the water not being clear, so little of it could be seen, that it was impossible to determine the species.

The length of the specimen was about forty-seven feet.—*J. W.*

Malaxis paludosa, Sw.—For several years I have had the pleasure of gathering a few specimens of this rare Orchid which has not, I think, been noticed before in the North Tyne district. It was growing on *Sphagnum* in a boggy place, by the side of a small runner of water which drains an extensive bog near Blackstur Lough. In a very limited area the specimens were very numerous, numbering when I last counted them about sixty, forming a little colony surrounded by the Buckbean, Bog Asphodel, and other bog-loving plants. The roots or bulbs were imbedded in the *Sphagnum.* This plant is no doubt often overlooked, as it is difficult to detect on account of its pale delicate green colour. It is to be feared that the ruthless and unwise system of constant and general draining on our moors will soon sweep this little plant and its congeners from even the most secluded bogs of our moorland districts.—*Richard Howse.*

Mimulus luteus, Linn.—Several patches of this plant, growing rather luxuriantly, have been observed on the banks of the Rede, near East and West Woodburn, and sometimes it has been found growing and in flower on small accumulations of gravel and also on large stones in the bed of the river. As these plants are often covered, and even rooted up by winter and summer floods, its appearance in fresh, and disappearance from known localities, is easily explained. An extensive spread of this plant grew a few years since on the north side of the road beyond Horsley, and extended upwards towards a small spring on the side of the fell. This American plant, not recorded in our district by Winch, is no doubt an outcast of cottage and other gardens, but it is singular that it should establish itself and flourish on the banks of our subalpine streams only.—*R. H.*

TYNESIDE NATURALISTS' FIELD CLUB.

LIST OF MEMBERS, DEC., 1876.

Elected.		
O.M.	Abbs, Rev. G. Cooper, B.A....	Cleadon Hall, Sunderland.
1863	Abbs, Henry	3, Hare Court, Temple, London.
1861	Abraham, John	Bold Street, Liverpool.
1859	Adamson, C. H..................	99, Howard Street, North Shields.
O.M.	Adamson, C. M..................	14, Clayton Street West, Newcastle.
1858	Adamson, Horatio...............	99, Howard Street, North Shields.
1859	Adamson, H. A..................	60, Tyne Street, North Shields.
1867	Adamson, L. W.	Windsor Crescent, Newcastle.
O.M.	Adamson, W.	Clayton Street West, Newcastle.
1875	Addison, Jno. Geo.	17, North Bridge Street, Sunderland.
1861	Alcock, Samuel, Jun.	Frederick Lodge, Sunderland.
1876	Alcock, John T..................	49, Falconar St., Shieldfield, Newcastle
1861	Anderson, Joseph	16, Ellison Place, Newcastle.
1869	Angus, C. H......................	184, High Street, Sunderland.
1872	Angus, Charles	Elswick Ordnance Works, Newcastle.
1876	Angus, J. G.	Fell House, Gateshead.
1865	Appleton, J. R.	Western Hill, Durham.
1849	Armstrong, George	3, Royal Arcade, Newcastle.
1875	Armstrong, J. L.	4, Northumberland Sq., North Shields.
1860	Armstrong, Luke, M.D.	26, Clayton Street West, Newcastle.
1876	Armstrong, T. J.	Hawthorn Terrace, Newcastle.
1861	Atkin, David	2, Somerset Place, Newcastle.
1872	Atkinson, Amos..................	68, Grey Street, Newcastle.
O.M.	Atkinson, G. C.	21, Windsor Terrace, Newcastle.
1874	Atkinson, J. B.	Ridley Mill House, Stocksfield.
1875	Atkinson, Ralph	6, Mulgrave Terrace, Gateshead.
1870	Atkinson, W. H.	91, Bedford Street, North Shields.
1876	Atkinson, W. J..................	Bridge Street, Morpeth.
1860	Atthey, Thomas, Assoc. L.S....	Gosforth.
1859	Backhouse, Edward	Ashburn House, Sunderland.
1866	Backhouse, T. W.	West Hendon House, Sunderland.
1874	Bagnell, H. A.	Winlaton.
1876	Bainbridge, Miss	Cliff House, Cullercoats.

Elected.		
1876	Bainbridge, T. H.	Market Street, Newcastle.
1861	Bainbridge, William, Jun.	82, King Street, South Shields.
1872	Balfour, Prof. F.M.	Trinity College, Cambridge.
1876	Balfour, Andrew	29, Northumberland St., Newcastle.
1859	Barkas, T. P., F.G.S.	Market Street, Newcastle.
1859	Barnes, J. W.	Messrs. Backhouse & Co., Durham.
1876	Barkus, Benjamin, M.D.	West Street, Gateshead.
1861	Barron, James	27, John Street, Bishopwearmouth.
1866	Barry, George	Neville Chambers, Newcastle.
1874	Barwick, John S.	7, Grange Crescent, Sunderland.
1851	Bell, Henry	13, Mosley Street, Newcastle.
1874	Bell, H. Oswin	Northumberland Terrace, Tynemouth.
1860	Bell, I. L., M.P., F.R.S	Rounton Grange, Northallerton.
1860	Bell, John Thomas	Iron Works, Monkwearmouth.
1865	Bell, Robert	3, Winterbottom Street, South Shields.
1864	Belt, Thomas	38, Southampton Buildings, Chancery Lane, London, W.C.
1876	Benson, J. G.	139, Westgate Road, Newcastle.
1860	Benson, William	Allerwash House, Hexham.
1849	Bethune, Rev. Angus, M.A.	The Vicarage, Seaham.
1851	Bewick, T. J.	Haydon Bridge.
O.M.	Bigge, Rev. J. F., M.A.	The Vicarage, Stamfordham.
1867	Bird, Rev. C., B.A.	The Vicarage, Chollerton, by Hexham.
O.M.	Blacklock, Joseph	66, Grey Street, Newcastle.
1871	Blake, Frederick	5, Collingwood Terrace, Jesmond.
1860	Blain, Thomas	174, High Street, Sunderland.
1872	Blair, Robert	Harton, South Shields.
1873	Bolam, Charles	Stella, Blaydon-on-Tyne.
1858	Bolton, Andrew, M.D.	31, Westgate Road, Newcastle.
1875	Bolton, George, L.R.C.P.	8, Park Terrace, Sunderland.
1858	Booth, George R.	50, West Sunniside, Sunderland.
1858	Bourne, William, M.A., M.D.	104, Howard Street, North Shields.
1876	Bowdon, Thomas	Sheriff Mount, Gateshead.
1874	Bowlker, Rev. Charles	Heddon-on-the-Wall, by Wylam.
1864	Bowman, Hugh	Windsor Terrace, Newcastle.
1859	Bowman, R. B.	Windsor Terrace, Newcastle.
1864	Bowman, Walter	Windsor Terrace, Newcastle.
1853	Boyd, Edward F.	Moor House, by Durham.
1871	Bradford, George	Escomb Bridge, Bishop Auckland.
1871	Bradford, James	Bunkers' Hill, Fence Houses.
1849	Brady, Prof., G. S., M.D.	22, Fawcett Street, Sunderland.
1858	Brady, Henry B., F.R.S. F.G.S.	29, Mosley Street, Newcastle.
1858	Bramwell, J. B., M.D.	5, Dockwray Square, North Shields.

Elected.		
1865	Branford, W. E.	90, Grey Street, Newcastle.
1875	Brice, Rev. G. E., M.A.	Wark, by Hexham.
1860	Briggs, R. S.	21, Fawcett Street, Sunderland.
1867	Brooks, J. C.	Wallsend.
1850	Browell, E. J. J.	East Boldon, by Newcastle-on-Tyne.
1876	Brown, Arthur	12, Bensham Crescent, Gateshead.
1872	Brown, Rev. Dixon, M.A.	Unthank Hall, Haltwhistle.
1860	Brown, John	69, Blenheim Street, Newcastle.
1871	Brown, Rev. I. I., B.A.	Silksworth, by Sunderland.
1862	Brown, T. W.	57, Villiers Street, Sunderland.
1876	Brown, John	269, Westgate Road, Newcastle.
1860	Browne, I. L.	The Lea, Riding Mill.
1854	Bruce, Gainford	2, Harcourt Buildgs., Temple, London.
O.M.	Bruce, Rev. J. C., LL.D	Framlington Place, Newcastle.
1861	Buck, Robert	17, Fawcett Street, Sunderland.
1872	Bulman, Thomas	5, Leazes Crescent, Newcastle.
1871	Bunning, T. W.	Mining Institute, Newcastle.
1874	Burns, David, H.M.Geol. Surv.	Alston, by Carlisle.
1863	Burnett, Jacob	Tynemouth.
1861	Burnet, Rev. W. R., M.A.	Bishopwearmouth.
1872	Burnup, Edwin	66, Rye Hill, Newcastle.
1860	Burnup, John, Jun.	2, East Parade, Newcastle.
1859	Burnup, Martin, M.D.	8, Derwent Place, Newcastle.
1867	Burrell, R. A.	Durham.
1874	Bungey, Thomas J.	12, Whitworth Place, Spennymoor.
1868	Bush, J. A.	3, St. Nicholas' Buildings, Newcastle.
1865	Byers, William	5, Esplanade, Sunderland.
1866	Cadogan, C. H.	Brinkburn Priory, Morpeth.
1875	Campbell, Charles	Bonneytown Side, near Linlithgow.
1876	Cameron, Robert	10, The Green, Sunderland.
1872	Capper, Cawthorne J.	Quayside, Newcastle.
1874	Carins, W. A.	4, Toward Street, Byker.
1865	Carr, John	21, Norfolk Street, North Shields.
1874	Carr, Edmund	Dunston Hill, Gateshead.
1874	Cave, H. A.	Herald Office, Sunderland.
1860	Challoner, J. S.	56, Dean Street, Newcastle.
1874	Charles, J. Selkirk	Gainford-on-Tees.
1870	Charlton, Ernest	Hesleyside, Bellingham.
1874	Charlton, Francis	Moot Hall, Newcastle.
1861	Charlton, William H.	Exchange Buildings, Newcastle.
1860	Chartres, William	18, Grainger Street West, Newcastle.

Elected.		
1876	Charlton, Henry	5, Catherine Terrace, Gateshead.
1876	Charlton, Mrs. Henry	5, Catherine Terrace, Gateshead.
1868	Clapham, Henry	Holly House, Gateshead.
1860	Clapham, R. C.	Earsdon.
1871	Clark, Isaac	Blaydon-on-Tyne.
1872	Clark, John	Haltwhistle.
1868	Clarke, T. T.	Post Office Buildings, North Shields.
1867	Clark, William	Mount Greenwich, Gateshead.
1873	Clark, Rev. W. A., B.A.	Belford Hall, Northumberland.
1876	Clark, Frederick	Oak Lea, Sunderland.
1876	Clark, Harry	Oak Lea, Sunderland.
1870	Clarke, H. Jun.	24, Dockwray Square, North Shields.
1865	Clay, William	19, Claremont Place, Newcastle.
1854	Clayton, John	Fenkle Street, Newcastle.
1858	Clephan, James	Saville Row, Newcastle.
1858	Clephan, Joseph	14, Side, Newcastle.
1860	Clephan, R. C.	14, Side, Newcastle.
1869	Cobb, Joseph	149, High Street, Sunderland.
1874	Cobb, Joseph, Jun.	149, High Street, Sunderland.
1875	Collie, Robert.	8, Manor Street, Newcastle.
1871	Common, J. F. F.	51, Percy Park, Tynemouth.
1867	Cooke, M. C.	Junction Villas, Upper Holloway, London.
1876	Cooke, Miss	124, Rye Hill, Newcastle.
1864	Cooke, Thomas	24, Grainger Street West, Newcastle.
1851	Coppin, John	Bingfield House, Corbridge-on-Tyne.
1869	Corder, Alexander	1, Carlton Terrace, Sunderland.
1868	Corder, Francis	Princes Street, Sunderland.
1862	Cowen, J. A.	Blaydon Burn, Blaydon-on-Tyne.
1865	Cowen, Joseph, M.P.	Stella House, Blaydon-on-Tyne.
1858	Cox, J. H.	33, Fawcett Street, Sunderland.
1876	Coxon, Joseph	139, Westgate Road, Newcastle.
1868	Crawford, B. C.	8, Jesmond Road, Newcastle.
1849	Crawshay, Edmund	Bensham Hall, Gateshead.
1875	Crease, J. R., M.D.	49, King Street, South Shields.
1875	Creigh, W. B.	5, Windsor Terrace, Newcastle.
1871	Crighton, J. Walker	43, Bewick Road, Gateshead.
1854	Crooks, St. John	9, Havelock Terrace, Sunderland.
1863	Crossling, Thomas	81, Clayton Street, Newcastle.
1869	Crossling, William	94, The Side, Newcastle.
1869	Cruickshank, Alexander	Mount Greenwich, Gateshead
1862	Culley, Matthew T.	Copeland Castle, Wooler.
1876	Cutter, John	2, Portland Terrace, Newcastle

Elected.		
1858	Daggett, William	3, Dean Street, Newcastle.
1860	Daglish, John	Collingwood Tower, Tynemouth.
1875	Daglish, William	Usworth Office, Quay, Newcastle.
1859	Dale, I. Brodrick	4, King Street, South Shields.
1864	Dance, T. W.	Shipcote Villa, Gateshead.
1870	Davis, John, M.R.C.S.	North Bridge House, Sunderland.
1867	Davison, Edwin C.	23, Park Place East, Sunderland.
1867	Davidson, Joseph	Cheviot Villa, Benton.
O.M.	Dees, R. R.	Pilgrim Street, Newcastle.
1871	Deighton, George	Chester Road, Sunderland.
1860	Denham, J. S., M.D.	5, Chapter Row, South Shields.
1849	De Mey, W. F., M.D.	15, Eldon Square, Newcastle.
1865	Dickinson, I. G.	Bank Chambers, Mosley Street.
1865	Dickinson, Robert	64, Pilgrim Street, Newcastle.
1864	Dickinson, William	37, Quayside, Newcastle.
1858	Dinning, William	95, Percy Street, Newcastle.
1858	Dixon, A. W.	Haldane Terrace, Jesmond, Newcastle.
1867	Dixon, Robert	3, Bensham Crescent, Gateshead.
1872	Dixon, Robert	37, Leazes Terrace, Newcastle.
1861	Dixon, W.	Thomas Street, Sunderland.
1863	Dixon, W. H., M.D.	35, Frederick Street, Sunderland.
1867	Dodds, Edwin	Low Fell, Gateshead.
1867	Dodds, M. S.	34, Quayside, Newcastle.
1849	Dodsworth, F.	Collingwood Street, Newcastle.
1869	Dodsworth, W. Y.	Collingwood Street, Newcastle.
1864	Douglas, James	Winlaton.
1867	Douglas, John	9, Hutt Street, Gateshead.
1876	Douglass, George	Regent Ho., Bensham Rd., Gateshead.
1875	Douglas, Mordey, L.R.C.P.	19, John Street, Sunderland.
1865	Downie, Henry	12, South Parade, Newcastle.
1876	Dowzer, Rev. Thomas, B A.	65, Campbell Street, Newcastle.
1876	Dresser, Henry Eeles	6, Tenterden Street, London.
1860	Drewitt, D. O.	Riding Mill.
1860	Dunn, A. M.	72, Jesmond Road, Newcastle.
1868	Dunn, Henry	22, Pilgrim Street, Newcastle.
1874	Durham, The Rt. Hon. Earl of	Lambton Castle, Chester-le-Street.
1859	Dwarris, Rev. B. E., M.A.	The Vicarage, Bywell.
1873	Eccles, Edward	South Close, Gateshead.
1875	Edwards, R. D.	National Provincial Bank, Gateshead.
1876	Egdell, George	The High Church, Morpeth.
O.M.	Ellison, Ralph Carr	Dunston Hill, Gateshead.
1870	Elsdon, W. B.	4, Royal Arcade, Newcastle.

Elected.		
O.M.	Embleton, Dennis, M.D.	Eldon Square, Newcastle.
1859	Eno, James C.	5, Groat Market, Newcastle.
1875	Errington, Joseph..............	Swalwell.
1870	Fairbairn, W. S.	The Green, Sunderland.
1875	Farlam, Thomas	3, Frank Place, North Shields.
1873	Favell, T. M.	14, Saville Street, North Shields.
1859	Fawcus, John.....................	106, Bell Street, North Shields.
1872	Featherstone, Rev. Thomas ...	Tynemouth.
1861	Featherstonhaugh, Edward ...	Roker, by Sunderland.
O.M.	Featherstonhaugh, Rev. W....	The Rectory, Edmondbyers, by Newcastle.
1860	Fell, H. B.	Biddick Hall, South Shields.
1861	Fenwick, George	34, Dockwray Square, North Shields.
1865	Fenwick, G. W....................	158, Rye Hill, Newcastle.
1860	Fenwick, John	18, Saville Street, North Shields.
1874	Fenwick, John George	Moorlands, Bulman Village.
1858	Fenwick, J. W.	Saville Street, North Shields.
1854	Finch, Rev. Thomas, B.A. ...	Morpeth.
1875	Fleming, J. N., M.D.	30, Clayton Street West, Newcastle.
1876	Fletcher, James...................	4, Higham Place, Newcastle.
1876	Fletcher, Jno. Wm.	20, Argyle Square, Sunderland.
1858	Forster, G. Baker, M.A., F.G.S.	The Hall, Backworth.
1850	Forster, James S.	High Heworth, Gateshead.
1871	Forster, Jno. Jas.	Leazes Terrace, Newcastle.
1861	Forth, Robert......................	100, Howard Street, North Shields.
1860	Foster, Robert	120, Rye Hill, Newcastle.
1868	Fothergill, J. M.	W. B. Lead Office, Northumberland St.
1872	Fothergill, Joseph.....	Whickham.
1872	France, George T................	Ford House, Felling.
1860	Francis, Matthew, M.R.C.S...	Frederick Street, Sunderland.
1865	Frazer, Donald	Forth Goods Station, Newcastle.
1873	French, J. H.......................	Queen Street, Newcastle.
1871	Gaine, John S.	21, Norfolk Street, Sunderland.
1876	Gardener, Matthew B.	29, Warden Street, Newcastle.
1876	Garland, James...................	Jesmond Road, Newcastle.
1860	Garrett, John......................	Bigg Market, Newcastle.
1876	Gemmell, David	17, St. Thomas' Street, Newcastle.
1851	Gibb, C. J., M.D.	Westgate Road, Newcastle.
1870	Gibson, Charles..................	Alma Place, North Shields.
1855	Gibson, Charles, M.D.	8, Eldon Square, Newcastle.
1871	Gibson, W. Colville	4, Side, Newcastle.

Elected.		
1873	Gilchrist, Charles	Primrose Hill, Fence Houses.
1872	Gillie, John	Westoe, South Shields.
1867	Gillies, Alexander	9, Ravensworth Terrace, Gateshead.
1872	Gillies, W,	5, Walker Terrace, Gateshead.
1860	Glaholm, J. P.	7, Claremont Place, Newcastle.
1876	Glen, D. C.	14, Anfield Place, Glasgow.
1864	Glover, John	Heaton Dene, Jesmond, Newcastle.
1876	Glover, William	Low Fell, Gateshead.
1854	Goddard, D. H.	Chester-le-Street.
1866	Gooch, T. L.	Saltwell, Gateshead.
1865	Gourley, Rev. G. M	Blanchland.
1861	Gowland, G. H.	178, High Street, Sunderland.
1874	Grace, W. Percy	Scotswood-on-Tyne.
1867	Graham, John	1, John Street, Sunderland.
1865	Greaves, John	17, Nun Street, Newcastle.
1859	Green, C. H.	Westoe, South Shields.
1862	Green, Edward	Beverley Terrace, Cullercoats.
O.M.	Green, R Y.	86, Pilgrim Street, Newcastle.
1875	Green, Thomas	Garden House, Monkseaton.
1854	Green, W.	Thornley House, Blaydon-on-Tyne.
1872	Greene, C. R.	Deckham Hall, Gateshead.
1858	Greener, Martin	Waterloo Place, Sunderland.
1858	Greenwell, Robert	19, Grey Street, Newcastle.
1875	Haddock, W.	32, Fawcett Street, Sunderland.
1867	Haggie, R. H.	Bentinck Place, Newcastle.
1873	Hamilton, W. H.	13, Union St., Shieldfield, Newcastle.
1874	Hancock, H. W.	Leazes Terrace, Newcastle.
O.M.	Hancock, John	4, St. Mary's Terrace, Newcastle.
1867	Hall, F. W.	2, St. Thomas' Street, Newcastle.
1863	Hall, G.	Trinity Cottage, Corbridge-on-Tyne.
1865	Hall, Rev. G. Rome, M.A.	Birtley Vicarage, Wark-on-Tyne.
1858	Hall, James	Palmer, Hall & Co., Quayside.
1862	Hall, John	Princes' Buildings, Quayside.
1866	Hall, Thomas	Winlaton.
1875	Hall, Matthew	16, Winterbottom St., South Shields.
1849	Hare, John	Grey Street, Newcastle.
1867	Harris, Charles	Exchange Buildings, Newcastle.
1864	Harrison, I. A.	41, Eldon Street, Newcastle.
1859	Haswell, F. R., R.N.	12, Howard Street, North Shields.
1859	Havelock, Michael	14, Sandhill, Newcastle.
1872	Hawdon, W.	South Docks, Sunderland.
1864	Hedley, T. F.	Murton Street, Sunderland.

Elected.		
1876	Hedworth, T. H.	Dunston, Gateshead.
1865	Henderson, M.	All Saints' Cemetery, Newcastle.
1865	Henderson, R.	Grainger Street, Newcastle.
1865	Henzell, W. M.	Belgrave Terrace, Newcastle.
1876	Herbert, George H.	Oxford Terrace, Gateshead.
1874	Heslop, F. H. B.	Alnwick, Northumberland.
1871	Heslop, Joseph	Brinkburn, by South Shields.
1868	Heslop, R. Oliver	West-End Terrace, Corbridge.
1874	Hick, Rev J. M., B.A.	Newburn, Ryton.
1867	Hill, H. Alfred	Union Street, North Shields.
1875	Hinde, John	Westoe, South Shields.
1860	Hinde, Rev. J. S., D.C.L.	Cramlington.
1870	Hitchcock, Rev. W. M., M.A.	The Rectory, Whitburn.
1865	Hobkirk, W.	Cramlington Colliery.
1859	Hodgkin, Thomas	St. Nicholas' Square, Newcastle.
1861	Hodgson, James	Riding Mill.
1870	Hodgson, S. S.	Nelson Street, Sunderland.
1864	Hodgson, W.	Pierremont Crescent, Darlington.
1864	Holmes, W. H.	Bensham Cottage, Gateshead.
1863	Hooppell, Rev. Dr. R. E., M.A.	Byers' Green Rectory, Spennymoor.
1874	Hopgood, J. F.	Vine Place, Sunderland.
1869	Howarth, Thomas L.	Fawcett Street, Sunderland.
1872	Howchin, Rev. Walter	Pleasant Place, Haltwhistle.
O.M.	Howse, Richard	17, Saville Row, Newcastle.
1863	Hudson, R. M.	Exchange Buildings, Sunderland.
1875	Hudson, Thomas	Thrift Street, South Shields.
1871	Humble, Charlton	38, Jesmond Road, Newcastle.
1871	Humble, S. J.	West Street, Gateshead.
1858	Humble, Thomas, M.D.	4, Eldon Square, Newcastle.
1861	Hunt, A. H.	Birtley, by Newcastle.
1876	Hunting, C. S.	2, Hutton Terrace, Jesmond Road.
1866	Huntley, D. P.	Ward Terrace, Sunderland.
1874	Huntley, F. C.	East Sunniside, Sunderland.
1867	Hutchinson, Cuthbert	Whitburn, Sunderland.
1875	Hutchinson, G. C.	Westmorland Road, Newcastle.
1876	Hutchinson, Henry	Elswick Ordnance Works, Newcastle.
1867	Hutchinson, Joseph	Durham.
1869	Hutchinson, W.	Gosforth Grove, Newcastle.
1872	Hutton, John	Mosley Street, Newcastle.
1876	Hutton, T. G.	South Moor, Sunderland.
1861	Irving, George	Central Station, Newcastle.

Elected.		
1865	Jackson, Thomas	Camden Street, North Shields.
1860	Jackson, Thomas, Jun.	Camden Street, North Shields.
1872	Jeffrey, Allan.....................	Winlaton.
1876	Joel, J. Edmondson	1, Newgate Street, Newcastle.
1873	Joicey, Col.	Newton Hall, Stocksfield.
1871	Johnson, Rev. A., B.A.........	Bywell, Stocksfield.
1867	Johnson, A. W..................	19, Claremont Place, Gateshead.
1875	Johnson, Rev. John	Hilton, near Yarm.
1875	Johnson, W.	South Preston Terrace, North Shields.
1876	Johnson, W. James	Pods' Bank, Allendale.
1867	Johnston, R. J..................	New Bridge Street, Newcastle.
1871	Johnston, William..............	48, Dean Street, Newcastle.
1866	Jones, John, F.G.S.	Royal Exchange, Middlesbrough.
1874	Jones, J. Rock	Rose Villa, Gosforth.
1867	Jordan, Joseph	The Close, Newcastle.
1876	Kay, W. T., L.R C.P.	5, Catherine Terrace, Gateshead.
1846	Kaye, William	Blackett Street, Newcastle.
1867	Kell, John	14, North Terrace, Newcastle.
1864	Kelman, William	8, The Oaks, Sunderland.
1875	Kendal, C. R., M.R.C.S.	Abbey Gate House, Hexham.
1860	Kennedy, J. F., L.R.C.P.	Eldon Square, Newcastle.
1875	Kersey, Edward.	Side, Newcastle.
1867	Kidson, John.....................	66, John Street, Sunderland.
1859	Kirkby, J. W.	Pirnie Colliery, Leven, Fife.
1865	Knothe, Rudolph	35, Close, Newcastle.
1869	Laidler, G. G.	Northumberland Street, Newcastle.
1872	Lamb, J. C., Jun................	Ryton.
1870	Lawson, Professor, M.A.	The Botanic Gardens, Oxford,
1863	Lawson, Rev. Edward, M.A.	Longhirst Hall, Morpeth.
1869	Lawson, John Nicholas	Holly Carr House, Sunderland.
1868	Lawson, George S.	Villiers Street, Sunderland.
1854	Leathart, James	Gallowgate, Newcastle.
1873	Leather, J. Towlerton	Middleton Hall, Belford.
1871	Lebour, G. A., F.G.S.	Lintz Green, Dipton.
1874	Lees, Dr. F. A., F.L.S..........	Middleton-in-Teesdale.
1868	Legge, Alfred.............	72, Grey Street, Newcastle.
1862	Legge, L. C.	Houghton-le-Spring.
1849	Leefe, Rev. J. E., M.A..........	Cresswell, Morpeth.
1871	Levy, Benjamin..................	Thornfield House, Bishopwearmouth.
1873	Lilburn, Charles	Murton Street, Bishopwearmouth.

Elected.		
1875	Lincoln, J.	South Shields.
1866	Lincoln, Thomas	5, Church Row, South Shields.
1873	Lindquist, Oscar	56, Eldon Street, Newcastle.
1869	Livesay, Frank	Littleton Ho., E. Dulwich, London, S.E.
1872	Lowe, Rev. Joseph, M.A.	The Vicarage, Haltwhistle.
1859	Lowrey, Edward	Lombard Street, Newcastle.
1865	Lowry, Richard	Lea Villa, Riding Mill.
1851	Luckley, George	Exchange Buildings, Newcastle.
1859	Lyall, George, F.G.S.	48, East Winchester St., South Shields.
1876	Maber, Rev. J. S.	Low Fell, Gateshead.
1852	Maling, C. T.	14, Ellison Place, Newcastle.
1863	Maling, E. A.	John Street, Sunderland.
1865	Maling, William	15, Jesmond Road, Newcastle.
1858	Marreco, Professor A. F.	College of Physical Science, Newcastle.
1846	Mather, Edward	Mosley Street, Newcastle.
1861	Matthew, George	West Sunniside, Sunderland.
1871	Maughan, Rev. J. A. C., M.A.	Mickley Vicarage, Stocksfield.
1873	Mangin, Rev. E. N., M.A.	Woodhorn Vicarage, Morpeth.
1876	Mawson, Miss, L. L.	Ashfield, Gateshead.
1867	M'Lean, Hugh, M.D.	Corbridge.
1860	Messent, Philip, C. E.	Tynemouth.
1870	Metcalfe, J. S.	60, Percy Park, Tynemouth.
1867	Meynall, E. J.	Durham.
1875	Middleton, R. M., Jun.	Fountain House, West Hartlepool.
1871	Millard, Joseph	Morpeth.
1872	Miller, Thomas R.	Winton House, Morpeth.
1869	Milling, John	14, Framlington Place, Newcastle.
1865	Moffatt, William	Pandon Dene House, Newcastle.
1864	Moor, W. T.	Library Place, Newcastle.
1862	Moore, J. M.	Market Place, South Shields.
1858	Moore, William	59, John Street, Sunderland.
1846	Moore, John	Beckinham, London.
1876	Moore, W.	Winchester Terrace, Newcastle.
1866	Morgan, G. B.	Villiers Street, Bishopwearmouth.
1859	Morison, D. P.	Collingwood Street, Newcastle.
1868	Morland, John	Westmorland House, Low Fell.
1860	Morton, Rev. Henry, B.A.	St. Stephen's Rectory, South Shields.
1876	Murdoch, J. Barclay	Hamilton Place, Langside, Glasgow.
1860	Murray, W., M.D.	34, Clayton Street, Newcastle.
1876	Myers, Rev. Thomas, M.A.	Westgate, Weardale.
1876	Nelson, R. C.	Roker, Sunderland.
1862	Nesham, T. C.	Northumberland Street, Newcastle.

Elected.		
1854	Newall, R. S., F.R.S.	Fern Dene, Gateshead.
1871	Nicholson, James	King Street, South Shields.
1860	Noble, Capt. A., R.A., F.R.S.	Elswick Ordnance Works, Newcastle.
1860	Norman, Rev. A. M., M.A.	Burnmoor Rectory, Fence Houses.
1862	Ogilvie, Joseph	101, Howard Street, North Shields.
1874	Oliver, Edward	Forest Lodge, Benton.
1876	Ormston, Miss M.	Musgrave, Gateshead.
1875	Osbeck, Peter	Tynemouth.
1871	Owen, G. O.	Percy Park, Tynemouth.
1867	Park, A. D.	Bigg Market, Newcastle.
1872	Park, John	34, Westmorland Terrace, Newcastle.
1858	Pattinson, John	The Side, Newcastle.
1867	Pattinson, Joseph	Gallowgate, Newcastle.
1846	Peacock, Reginald	East Sunniside, Sunderland.
1853	Peacock, Septimus	East Sunniside, Sunderland.
1872	Pearman, George W.	Prince Street, Sunderland.
1860	Peart, R. S., M.D.	22, Dockwray Square, North Shields.
1864	Peckett, G. C.	2, Park Place East, Sunderland.
1867	Peele, Richardson	Durham.
1874	Peile, George	Shotley Bridge.
1860	Pemberton, R. L.	The Barns, Sunderland.
1876	Penney, Jno. H.	Gas Office, South Shields.
1854	Philipson, John	9, Victoria Square, Jesmond.
1862	Philipson, G. H., M.D., M.A.	Eldon Square, Newcastle.
1866	Philipson, J. A.	15, Pilgrim Street, Newcastle.
1875	Pike, Thomas	Ocean Road Terrace, South Shields.
1861	Pilkington, Edward	Frederick Street, Sunderland.
1875	Pinkney, William	46, John Street, Sunderland.
1876	Plummer, Ben., Jun.	35, Westmorland Road, Newcastle.
1874	Pocock, F. A., R.N.	The Wellesley, South Shields.
1868	Porrett, J. C.	1, Cumberland Terrace, Sunderland.
1859	Potter, Lt. Col. Addison	Heaton Hall, by Newcastle.
1862	Potts, R. H.	Low Street, Sunderland.
1871	Potts, George Calder	Central Buildings, Gateshead.
1874	Potts, John A.	11, Gloucester Terrace, Newcastle.
1871	Powell, Rev. R. P., M.A.	The Rectory, Bellingham.
1869	Price, John	Rose Villa, Jarrow.
1860	Proctor, B. S.	11, Grey Street, Newcastle.
1861	Proctor, W. W.	33, Side, Newcastle.
1862	Procter, Henry	Northumberland Mills, Newcastle.

Elected.		
1865	Procter, Matthew	Osborne Terrace, Newcastle.
1876	Pumphrey, Thomas	Summerhill Grove, Newcastle.
1861	Punshon, N.	Dean Street, Newcastle.
1871	Raine, F.	Durham.
1874	Ranson, F. P. F., M.D.	The Infirmary, Sunderland.
1874	Rea, Jas. Sturge	Beverley Terrace, Cullercoats.
1861	Reay, John	Park Place East, Sunderland.
1862	Redmayne, J. M.	27, Grey Street, Newcastle.
1862	Redmayne, R. R.	Low Fell, Gateshead.
1860	Reed, J. R.	15, Park Place West, Sunderland.
1869	Reed, Edward	2, Bentinck Villas, Newcastle.
1865	Reid, David	Grey Street, Newcastle.
1867	Reid, W. B.	Leazes Brewery, Newcastle.
1869	Reid, John C., M.D.	Newbiggen-by-the-Sea.
1876	Rennoldson, James	Beverley Terrace, Cullercoats.
1875	Renton, George, M.D.	Consett.
1875	Renwick, George	9, Queen's Terrace, Gateshead.
1876	Rich, F. W.	Union Chambers, Grainger St. West.
1865	Richardson, Edward	Leazes Terrace, Newcastle.
1866	Richardson, J. M.	28, Victoria Square, Newcastle.
1876	Richardson, Thomas	Harle St., Mount Pleasant, Gateshead.
1870	Richardson, E. H.	Leazes Terrace, Newcastle.
1874	Ridsdale, John	4, Bigg Market, Newcastle.
1868	Ritson, Thomas F.	15, Foyle Street, Sunderland.
1870	Roberts, Thomas	Clarence Crescent, Newcastle.
1864	Robertson, W. L.	Durham.
1868	Robertson, David, F.G.S.	42, Kelvin Grove, Glasgow.
1876	Robinson, J. Walton	Enfield, Gateshead.
1861	Robinson, W. S.	68, John Street, Sunderland.
1849	Robson, E. Capper	45, Queen Street, Sunderland.
1863	Robson, S. S.	Hendon Ropery, Sunderland.
1864	Robson, Frederick	45, Dean Street, Newcastle.
1865	Robson, W. C.	29, Blackett Street, Newcastle.
1870	Robson, Sept. H.	9, Thornhill Terrace, Bishopwearmouth
1871	Robson, M. H.	18, Albion Place, Newcastle.
1872	Robson, James	7, Chapter Row, South Shields.
1872	Robson, John E.	Sea View, Hartlepool.
1873	Robson, Shafto	Bewick Road, Gateshead.
1874	Robson, Stephen E.	2, Esplanade, Sunderland.
1875	Rogers, Rev. Percy, M.A.	Simonburn Rectory, Humshaugh.
1868	Rowell, George	Exchange Buildings, Newcastle.
1876	Ryott, W. H.	Saltwell Grove, Gateshead.

Elected.		
1860	Sample, Thomas	Bothal Castle, Morpeth.
1865	Scholefield, Henry	St. Nicholas' Buildings, Newcastle.
1870	Scorfield, E. S.	Quayside, Newcastle.
1873	Scott, Christopher	18, Lovaine Place, North Shields.
1872	Scott, George	Westoe Terrace, South Shields.
1862	Scott, Stephen	42, Jesmond Road, Newcastle.
1871	Sharp, Thomas	16, Clayton Street, Newcastle.
1871	Sharp, John	New Greenwich House, Gateshead.
1874	Shaw, Benjamin	Northumberland Street, Newcastle.
1867	Shaw, Frederick	35, Close, Newcastle.
1876	Shevill, W. H.	5, Norfolk Street, Sunderland.
1864	Shiel, George	Fawcett Street, Sunderland.
1873	Shiel, John	Usworth.
1867	Shiel, G. R.	The Cottage, Stockton Road, Sunderland.
1854	Shield, G. R.	Mosley Street, Newcastle.
1861	Shields, John	Durham.
1866	Short, John	1, Camden Street, North Shields.
1870	Shorthose, John	Hartford Bridge.
1858	Shotton, Edward	53, Tyne Street, North Shields.
1870	Sibun, James	2, Nelson Street, Sunderland.
1859	Simey, Ralph	1, John Street, Sunderland.
1855	Simpson, J. B.	Hedgefield House, Ryton.
1869	Siddle, Robert	Vine Place, Sunderland.
1870	Skelton, W.	High Street, Bishopwearmouth.
1875	Skemp, Rev. C. W.	Mather Street, Newcastle.
1864	Smart, Collin	18, John Street, Sunderland.
1850	Smiles, Henry	44, Bedford Street, London, W.C.
1868	Smith, R. Ayre, M.D.	5, Park Terrace, Sunderland.
1868	Smithson, W.	15, Harrison Place, Newcastle.
1867	Snowball, James	Millfield Terrace, Gateshead.
O.M.	Sopwith, T., F.R.S., F.G.S.	103, Victoria Street, London.
1873	Southwell, Charles	Gurry Lodge, Kilburn, London.
1867	Spence, C. J.	North Shields.
1871	Spence, Faraday	67, Grey Street, Newcastle.
1861	Spence, Joseph	110, Howard Street, North Shields.
1858	Spence, J. F.	110, Howard Street, North Shields.
1860	Spence, J. F., jun.	110, Howard Street, North Shields.
1858	Spence, Robert	107, Howard Street, North Shields.
1862	Spence, Thomas	107, Howard Street, North Shields.
1874	Spencer, G. E,	Victoria Street, Newcastle.
1870	Spencer, J. P.	Town Hall, North Shields.
1861	Spencer, Thomas	The Grove, Ryton.

Elected.		
1856	Spencer, Michael	Millfield, Newburn.
1862	Stanger, J.	Chronicle Office, Newcastle.
1865	Steele, Thomas	Bank Buildings, Sunderland.
1850	Stephens, Thomas, M.R.C.S...	31, Dockwray Square, North Shields.
1875	Stephenson, James	14, Byron Terrace, Newcastle.
1870	Stephenson, J. A.	1, Queen Street, Newcastle.
1869	Stephenson, Thomas............	9, Grey Street, Newcastle.
1851	Stevenson, A. S.	Tynemouth.
1865	Stokoe, Thomas..................	13, Claremont Place, Newcastle.
1870	Storey, Samuel	Bank Buildings, Sunderland.
1867	Stout, G.	82, King Street, South Shields.
1854	Straker, John	West House, Tynemouth.
1868	Straker, Joseph Henry.........	Willington House, Durham.
1873	Stuart, James	42, Side, Newcastle.
1875	Surtees, J.	32, Falconar Street, Newcastle.
1865	Sutherland, B. J.	Sandhill, Newcastle.
1860	Sutherland, Robert	50, Howard Street, North Shields.
1859	Swan, J. W.	Mosley Street, Newcastle.
1867	Swan, Robert.....................	7, New Square, Lincoln's Inn, London.
1859	Swanston, William	Quayside, Newcastle.
1876	Swanwick, Eustace M.	Church Street, West Hartlepool.
1862	Swithinbank, G. E.	Ormleigh, Anerley, London, S.E.
1858	Tate, R. M	20, Camden Street, North Shields.
1867	Taylor, Hugh......................	Chipchase Castle, Wark-on-Tyne.
1867	Taylor, Rev. Hugh	Humshaugh Rectory, North Tyne.
1873	Taylor, J.	44, North Bridge Street, Sunderland.
O.M.	Taylor, John	2, Lovaine Place, Newcastle.
1869	Temple, W.	Gladstone Street, Newcastle.
1860	Temperley, N.	Clavering Place, Newcastle.
1855	Temperley, W. A.	Hexham.
1867	Thackray, W. jun.	7, The Avenue, Sunderland.
1867	Thiedemann, Rudolph	Lombard Street, Newcastle.
1869	Thirkell, W. T.	7, Grange Crescent, Bishopwearmouth
1874	Thompson, Alfred...............	16, John Street, Sunderland.
1850	Thompson, C.	Winlaton.
1851	Thompson, George	Winlaton.
1873	Thompson, Joseph	10, Bewick Road, Gateshead.
1860	Thompson, J. T.	Winlaton.
1858	Thompson, Thomas	Lambton & Co., Grey St., Newcastle.
1860	Thompson, Thomas	The Cedars, Sunderland.
1876	Thompson, W. H. S.	15, New Bridge Street, Newcastle.
1875	Thubron, Robert	East Boldon, by Newcastle.

Elected.		
1865	Tidswell, W.	67, Westmorland Road, Newcastle.
1861	Tone, W.	58, Villiers Street, Sunderland.
1849	Trevelyan, Sir W. C., Bart	Wallington Hall, Morpeth.
1850	Tristram, Rev. Canon H. B.	Durham.
1862	Turnbull, Edward	9, Hart Road, West Hartlepool.
1865	Tweddell, G. M.	Stokesley.
1873	Vann, S. R.	Durham.
1873	Vasey, T. E.	Chemical Works, South Shields.
1874	Vaughan, Rev. C.	Lambley Rectory, Haltwhistle.
1861	Vermehren, H.	Exchange Buildings, Newcastle.
1850	Vint, Robert	The Cedars, Sunderland.
1865	Waddington, Thomas	Tyne Vale Terrace, Bensham.
O. M.	Wailes, George	Royal Arcade, Newcastle.
1866	Wait, James	23, Northd. Square, North Shields.
1866	Wait, John	23, Northd. Square, North Shields.
1860	Wake, W. M.	John Street, Sunderland.
1848	Wallis, R., M.R.C.S.	Old Ridley, Stocksfield.
1872	Warden, G. C., jun.	54, Percy Park, Tynemouth.
1872	Warden, Walter H.	54, Percy Park, Tynemouth.
1853	Warwick, John	108, Rye Hill, Newcastle.
1871	Wassermann, J. G.	50, Beverley Terrace, Cullercoats.
1866	Watson, Henry	Millfield House, Eldon St., Newcastle.
1864	Watson, Mason	Prudhoe Street, Newcastle.
1869	Watson, Robert	Grey Street, Newcastle.
1861	Watson, R. S.	101, Pilgrim Street, Newcastle.
1865	Watson, T. C.	21, Blackett Street, Newcastle.
1867	Watson, T. E.	75, Clayton Street, Newcastle.
1860	Waugh, J. G.	Gray's Inn Square, London.
1863	Wayman, I. W.	47, Villiers Street, Sunderland.
1860	Welford, George, M.R C.S.	29, John Street, Sunderland.
1860	West, Tuffen	Frensham, Farnham, Surrey.
1868	Westmacott, Percy	Benwell Villa, Newcastle.
1867	Wheeler, Rev. R. F., M.A.	The Vicarage, Whitley.
1867	Wheldon, John	Paternoster Row, London.
1876	White, W. H.	Killingworth House.
1876	White, Chas. Fred , F.L.S.	42, Windsor Road, Ealing, W.
1868	Wiener, Martin	Exchange Buildings, Sunderland.
1863	Williamson, Sir H., Bart.	The Hall, Whitburn, Sunderland.
1852	Williamson, John	Westoe, South Shields.
1855	Wilson, Charles	High Street, Sunderland.
1865	Wilson, E. J.	Custom House, Liverpool.

Elected.		
1870	Wilson, G. A.	Eldon Place, Newcastle.
1871	Wilson, Henry	38, Grey Street, Newcastle.
1864	Wilson, Henry	Westoe, South Shields.
1869	Wilson, Henry V.	9, Winchester Terrace, Newcastle.
1874	Wilson, James	Villiers Street, Sunderland.
1870	Wilson, John..	39, Rye Hill, Newcastle.
1865	Wilson, John	32, Union Street, North Shields.
1866	Wilson, Joseph	Cleadon, by Sunderland.
1867	Wilson, Joseph	3, Wentworth Place, Newcastle.
1866	Wilson, R. H., M.D.	West Street, Gateshead.
1851	Wilson, Thomas	Grainger Street, Newcastle.
1872	Winter, J. Martin	50, Westgate Road, Newcastle.
1861	Wood, Lindsay	Southhill, Chester-le-Street.
1870	Wood, Peter	Grace Terrace, Sunderland.
1874	Worswick, R. A.	6, St. Edward's Road, Gateshead.
1875	Yeld, Henry J., M.D.	2, Claremont Terrace, Sunderland.
1865	Youll, John G.	18, Grainger Street West, Newcastle.
1866	Young, C. H.	Goldspink Hall, Jesmond.
1858	Young, Emanuel	Dock Yard, North Shields.
1872	Young, Frederick	Ogle Terrace, South Shields.
1871	Young, James	Ogle Terrace, South Shields.
1874	Young, J. R.	2, Windsor Crescent, Newcastle.
1864	Young, Oliver	20, Sandhill, Newcastle.
1861	Young, Thomas	4, Chapter Row, South Shields.

Any corrections of the above list of Members will be thankfully received. Members are particularly requested to send notice of any change of residence immediately to the Secretaries.

HONORARY MEMBERS.

Elected.		
1854	Airey, Sir G. B., M.A., F.R.S.	Greenwich Observatory.
1868	Baker, J. G.	Kew Gardens, London.
1861	Bate, C. Spence	Plymouth.
1861	Glaisher, James, F.R.S....	13, Dartmouth Terrace, Lewisham.
1861	Jones, Prof. T. Rupert, F.G.S.	Farnborough, Hants.
1863	Mennell, H. T., F.L.S.	20, Fenchurch Street, London.
1861	Oliver, Prof. D., F.L.S..........	Kew Gardens, London.
1863	Perkins, V. R......................	Wooton-under-Edge, Gloucester.

NATURAL HISTORY SOCIETY

OF

NORTHUMBERLAND, DURHAM, AND NEWCASTLE-UPON-TYNE.

REPORT FROM APRIL, 1872, TO JULY, 1874.

THE somewhat lengthened period which has elapsed since last the members were called together has been owing chiefly to the absence of any matters on which it was essential that your Committee should report.

Since April of 1872 the work of the Society has proceeded very much as usual, and offers really but little on which to remark. The number of members has continued about stationary, as a result of which, the Society can hardly be said to have reaped its full share of the commercial prosperity of the district. Your Committee would again urge on individual members the necessity of exertion in this respect. By the exercise of the strictest economy your Committee have been able to pay their way, and to maintain a balance in hand, but the development of the collection has, your Committee cannot but feel, been seriously interfered with thereby.

Your Committee have to record, with feelings of the deepest regret, the losses which the Society has sustained, during the period covered by this report. They have but to mention the successive deaths of Albany Hancock, of Thomas Bold, and of Dr. Edward Charlton, to remind this meeting of the gaps produced in the ranks of local workers in our science.

A list is appended of the various additions to the Society's collection, among which the most prominent are:—

The Entomological collections of Mr. Bold, presented by his relatives.

The Mineralogical collections of Dr. Charlton acquired by purchase.

A large and valuable collection of Minerals, Fossils, Polished Marbles, and Rock Specimens presented by Norman Cookson, Esquire.

It will be seen also that there has been a steady, if not very large, influx of miscellaneous specimens.

Your Committee have now to congratulate the Society upon the fact that the Chair of Biology, spoken of at our last meeting as a possibility, is now an accomplished fact. The large use which has been made during the three years of the collections for teaching purposes will now be still further extended and systematized.

A few alterations in the list of Honorary Curators are, as will be seen, rendered necessary by death vacancies, which it is proposed by your Committee to fill as follows:—

Geology and Mineralogy, add Mr. G. A. Lebour.

Committee, add Mr. G. A. Lebour in place of Mr. R. B. Bowman; Mr. William Dinning in place of Mr. John Hancock.

OFFICERS OF THE NATURAL HISTORY SOCIETY,

1874.

PATRON.

His Grace the Duke of Northumberland.

PRESIDENT.

The Lord Bishop of Durham.

VICE-PRESIDENTS.

Sir Walter C. Trevelyan, Bart.
The Rt. Hon. the Earl Ravensworth.
The Rt. Hon. the Earl of Tankerville.
Sir W. G. Armstrong, C.B.
A. J. B. Cresswell, Esq.
John Clayton, Esq.
Lieut.-Col. Addison Potter.
The Worshipful the Mayor of Newcastle.
Ralph Carr-Ellison, Esq.
Robert Ingham, Esq.
Rev. John F. Bigge.
I. Lowthian Bell, Esq.
R. S. Newall, Esq.
G. C. Atkinson, Esq.
D. Embleton, Esq., M.D.
Henry B. Brady, Esq.
John Hancock, Esq.
R. B. Bowman, Esq.

TREASURER.

Joseph Blacklock, Esq.

SECRETARIES.

Mr. A. Freire-Marreco.
Mr. H. Bowman.

COMMITTEE.

Mr. Thomas Bell.
Mr. E. Boyd.
Mr. John Coppin.
Mr. John Daglish.
Mr. R. R. Dees.
Mr. William Dinning.
Mr. D. O. Drewett.
Mr. John Glover.
Mr. G. A. Lebour.
Mr. Wm. Maling.
Mr. D. P. Morison.
G. H. Philipson, M.D.
Mr. John Rogerson.
Mr. H. Scholefield.
Mr. C. Thompson, jun.

HONORARY CURATORS,

1874.

ZOOLOGY.

VERTEBRATA.

D. Embleton, M.D.
J. Hancock.

ARTICULATA.

G. S. Brady.
W. Dinning.
J. Hancock.
Rev. A. M. Norman.
D. P. Morison.

MOLLUSCA.

Rev. A. M. Norman.

RADIATA.

H. B. Brady.
D. O. Drewett.
J. Coppin.
Rev. A. M. Norman.

BOTANY.

Rev. J. F. Bigge.
R. B. Bowman.
G. S. Brady.
H. B. Brady.

GEOLOGY.

E. Boyd.
E. J. J. Browell.
J. Daglish.
W. Dinning.
J. W. Kirkby.
G. A. Lebour.

MINERALOGY.

Henry Bowman.
E. Charlton, M.D.
A. Freire-Marreco.
G. A. Lebour.

GENERAL CURATOR.

Richard Howse.

KEEPER OF THE MUSEUM.

Joseph Wright.

THE TREASURER IN ACCOUNT WITH THE NATURAL HISTORY SOCIETY,

CURRENT ACCOUNT FROM 22ND APRIL, 1872, TO 16TH JULY, 1874.

1874.	Dr.	£	s.	d.
July 16.	To Balance brought forward from last Account	143	17	2
	,, Subscriptions from Members	310	13	0
	,, Ditto from Associates	13	0	0
	,, Institute of Mining Engineers	40	0	0
	,, Fine Arts Society, on account of Rent	103	16	0
	,, Literary and Philosophical Society	80	0	0
	,, Admissions	344	0	3
	,, Donation from Mrs. Bilton	2	0	0
	,, Proprietors of *Newcastle Chronicle*, for Signboard	2	0	0
	,, Cash overpaid into Bank	0	2	0
		£1039	8	5

1874.	Cr.	£	s.	d.
	By Salary to Keeper of Museum	181	5	0
	,, John Clayton, Esq., Two Years' Interest, less Income Tax	157	13	4
	,, Fire Insurance	26	12	6
	,, Tradesmen's Accounts	201	8	8
	,, Sundry Small Accounts	48	8	0
	,, Share of cost with Tyneside Field Club for Printing Transactions	74	7	2
	,, Geological Model of Wealden District	2	15	0
	,, Richard Howse, Curatorship Account	22	16	6
	,, Mrs. Isabella Bilton, for five cases of Stuffed Birds	22	7	0
	,, Robert Damon, for Fossils	14	0	0
	,, E. Wood, do.	2	10	0
	,, T. Atthey, do.	15	3	0
	,, Fossils purchased by R. Howse	3	0	0
	,, Executors of the late Dr. Charlton, for a collection of Minerals	20	0	0
	,, Land and Income Tax	1	19	8
	,, Balance in Bank	245	2	7
		£1039	8	5

LIST OF DONATIONS TO THE MUSEUM

OF

THE NATURAL HISTORY SOCIETY,

FROM MAY, 1872, TO JUNE, 1874.

BOOKS, ETC.

Transactions of the Newcastle Chemical Society, Parts 2, 3, and 4. *The Chemical Society.*

Proceedings of the Liverpool Literary and Philosophical Society, Vols. XXV. XXVI., and XXVII. *The Society.*

Illustrated Catalogue of the Harvard Museum, Cambridge, U.S. America, Nos. 4, 5, and 6, and Annual Report, 1871. *Prof. Agassiz.*

Proceedings of the Zoological Society of London for 1871—73, and Part 1, 1874. *The Society.*

Reports of the Sittings of the Natural History Society Der Isis, in Dresden, 1872. *The Society.*

Catalogue of the Willet Collection of Fossils in the Brighton Museum. *Prof. T. R. Jones, F.R.S.*

Proceedings of the Academy of Natural Sciences, Philadelphia, U.S. America. 1871—3. *The Academy.*

Annals of the Lyceum of Natural History, New York, U.S. America, 1871. *The Lyceum.*

Reports of the Smithsonian Institution, Washington, U.S. America, 1870 and 1871. *The Institution.*

Reports of the Commissioner of Agriculture, Washington, U.S. America, 1870 and 1871. *The Department of Agriculture, Washington.*

Transactions of the Plymouth Institution and Devon and Cornwall Natural History Society, Vol. IV., Parts 3 and 4; and Part 3, Vol. III., of the Flora of Devon and Cornwall. *The Institution.*

A Series of Botanical Labels for British Plants, by John E. Robson, West Hartlepool. *The Author.*

A package of Transactions from the Royal Swedish Academy of Sciences, Stockholm. *The Academy.*

Bulletin of the Museum of Comparative Zoology, Harvard College, Cambridge, U.S. America, Nos. 5 and 6. *Prof. L. Agassiz.*

A parcel of Books from the Royal Norske University, Christiania, Norway. *The University.*

Transactions of the Geological Society of Glasgow. Part 2. Vol. IV. *The Society.*

On the Histology of the Test of the Class Palliobranchiata, by Prof. W. King, Galway. *The Author.*

Reports of the Proceedings of the American Association for the Advancement of Science, 1871 and 1872. *The Association.*

Two Parts of Transactions of the Natural History Society of Copenhagen, 1871. *The Society.*

Archives of Science and Transactions of the Orleans County Society of Natural Sciences. Vol. I., Nos. 4 and 5. *The Society.*

"Nature," for 1872 and 1873. *The Publishers.*

Proceedings of the American Philosophical Society, Philadelphia. No. 80, Vol. XII.; Nos. 90 and 91, Vol. XIII.; and Transactions, Part 1, Vol. XV. *The Society.*

On the Silurian Brachiopoda of the Pentland Hills, by Thos. Davison, F.R.S. *The Geological Society of Glasgow.*

On the Acrididæ of North America, by Cyrus Thomas, Ph. D.

Synopsis of New Vertebrata from the Tertiary of Colorado, by Prof. E. D. Cope.

Contributions to the Extinct Vertebrate Fauna of the Western Territories, by Joseph Leidy.

Lists of Elevations of that Portion of the United States West of the Mississippi, by Henry Gannett.

Meteorological Observations in Utah, Idaho, and Montana, during 1872. *From the office of the United States Geological Survey.*

Transactions of the Academy of Science, St. Louis, U. S. America, Vol. III. No. 1. *The Academy.*

Annual Report of the Chief Signal Office, the Secretary of War, for the year 1872. *The American War Department.*

Memoirs of the American Academy of Arts and Sciences. Vol. IX. Part 2; and Nos. 53 to 63 of the Proceedings, Vol. VIII. *The Academy.*

Report of the United States Survey of the Territories, for the years 1867, 1868, 1869. *Dr. F. N. Hayden.*

On the Synonyms of the European Spiders, by Dr. T. Thorell, Professor of Zoology, University of Upsala. *The Author.*

Transactions of the Berwickshire Field Club, Part 3, Vol. VI. *The Club.*

BIRDS, REPTILES, ETC.

Specimens of the Blue Titmouse, Wood Wren, Redstart, Whinchat, Robin, and Pied Wagtail (immature); and Specimens of Great Tit, Marsh Tit, and Sparrow. *Mr. F. Hutchinson.*

Skin of the King Bird of Paradise (*Cicinnurus regius*). *Mrs. W. D. Cruddas.*

Two Specimens of the Arctic Tern (male and female), and one of the Common Tern (immature). *H. B. Brady, Esq., F.R.S.*

Two Eggs of the Grey Parrot. *Miss Kellerman.*

Specimen of the Great Spotted Cuckoo (*Cuculus glandarius)*, shot at Clintburn, near Bellingham, August 5, 1870.
W. H. Charlton, Esq., Hesleyside.

One Specimen of the Blackwinged Stilt, one Stone Curlew, one Blacktailed Godwit, two Dartford Warblers, two Bluethroated Robins (male and female), two Great Crested Grebes (summer), two Rollers, two Wood Larks, two Turtle Doves, two Bee Eaters, and two Pallas' Sand Grouse.
Hugh Taylor, Esq., Chipchase Castle.

Two Specimens of the Rook (*Corvus frugilegus*), shot at Long Benton.
Mr. Edwin Bold.

Specimen of Eider Duck (immature) and Herring Gull (immature).
Mr. R. Howse.

Skin of a Bee-eater *(Nictyornis amictus*), from India. *Master G. Noble.*

A Specimen of the Starling (white variety), shot at Islay.
Mr. Thos. Hannan, per R. Y. Green, Esq.

Two Eggs of the Wigeon, two of the Red-breasted Merganser, from Loch Awe ; and two of the Red-throated Diver, from Sutherlandshire.
G. C. Atkinson, Esq.

A few Birds Eggs from the Farne Islands. *Prof. A. S. Herschell.*

Femur of the Dodo, from the Mauritius. *Mr. W. Bowden.*

An Egg of the Guillemot, and one of the Sandwich Tern.
Miss Cruddas, Elswick.

A Specimen of the Chameleon, and a Specimen of the Turtle (young), (*Chelonia imbricata).* *Mr. T. P. Barkas*

Specimens of Snakes from South Africa. *Mr. William Dinning.*

Two Snakes and Centipedes. *Master C. L. Lightfoot.*

Three Specimens of *Lepidosteus osseus*, and one of *Amia calva*, from America. *Prof. J. H. McChesney.*

A Specimen of the Globe Fish, a Skeleton of the Trunk Fish, and two Frogs, from Montserrat. *Mrs. Sturge, Montserrat.*

Fish Spine, from Antigua. *Mrs. Sanson.*

The Entomological Collections of the late Mr. Thos. J. Bold, Long Benton.
Mr. Edwin Bold.

Two Specimens of *Unio margaritifera*, from Reedwater. *Mr. Sutton.*

A Collection of British and Foreign Shells.
Mrs. Elizabeth Williams, Well Walk, Hampstead.

Twelve Specimens of *Ianthina fragilis*, from Islay. *R. Y. Green, Esq.*

Specimen of Wood bored by Teredo. *Mr. J. Porter, Coble Dene, North Shields.*

Two Specimens of the Lobster (*Homarus vulgaris*), taken off Tynemouth.
Mr. Hawks, jun., Marsden.

A Specimen of a Siliceous Sponge *(Meyerella claviformis)*, from the Phillipine Islands. *Mr. Edwin Scott, Sunderland.*

Specimens of Marine and Freshwater Sponges, and a few Fossils, etc.
D. O. Drewett, Esq., Riding Mill.

Specimen of Green Fungus *(Peziza æruginosa).*
Sir W. C. Trevelyan, Bart.

MINERALS, FOSSILS, ETC.

A Specimen of Galena, from Hebburn Colliery. *Mr. W. Reed.*

A Collection of Rock Specimens, from the Cheviots; forty Specimens of Tertiary Fossils (*Eocene*), from Cuise la Motte, Pierrefond; also a few Rock Specimens and Fossils from various localities. *G. A. Lebour, Esq.*

Specimen of Sandstone, with Dendritic Markings, from Weardale.
Mr. T. H. Vint, South Shields.

Specimens of Rock Salt, from the Royal Mines of Stassfurth.
Messrs. Clephan & Wiencke.

Specimens of Iceland Spar. *Mr. John Laws.*

Specimen of Freshwater Limestone, from Burdie House, and a Specimen of Trap Ash, from the Isle of Arran. *Prof. D. Page, LL.D.*

Specimens of Coal, from Japan and Australia.
Mr. Edwin Scott, Sunderland.

A Series of Rock Specimens, from the Magnesian Limestone, county of Durham. *A. W. Dixon, Esq.*

Nine Specimens of Rocks, from Portland. *Mr. Symes, Westgate Road.*

A few Rock Specimens, from Wales. *Prof. A. S. Herschell.*

Specimens of *Productus*, from the Carboniferous Limestone, Corbridge.
Mr. Wm. Dinning.

A Specimen of *Ulodendron*, from the Carboniferous Limestone Series, (Shale beneath Plashetts Main Seam) Smales, North Tyne.
G. A. Lebour, Esq.

An extensive Collection of Minerals, Marbles, Rock Specimens, and Fossils.
Norman C. Cookson, Esq.

Specimen of Coal, from Chevington Colliery.
Mr. T. N. Coates, Chevington.

Specimen of Galena in Coal, from Eldon Colliery, Yorkshire.
Luke Armstrong, Esq.

Specimens of Fossils, from the Lias, Yorkshire. *Joseph Duff, Esq.*

MISCELLANEA.

A Bow and two Arrows from Ceylon.
Rev. S. R. Coxe, Hawthorn Vicarage, Sunderland.

A Pair of Moccasins and Knife-Sheath, from North America.
Master Geo. Noble.

An Oak Cabinet, fitted under the cases in the Geological Room.
Mr. W. T. Moor.

REPORT, JULY, 1875.

YOUR Committee have to report to the annual Meeting as follows on the progress of the Society during the past year.

The numbers of the Society have remained about stationary.

The Museum has continued to be visited, as usual, by large numbers of strangers, the receipts for admission being much the same in amount, viz., £133 11s. 11d.

The only addition of any importance which has been made to the Society's collections is a valuable collection of Fossils, brought together by Mr. J. Dew Smith, of Trinity College, Cambridge, and presented by him at the instance of Mr. H. B. Brady; also a series of Mammalian remains from the phosphate deposits of France, presented by Messrs. Spence and Irwin.

The last remaining space for cabinets is at present being filled in with drawers by Mr. Moor, under the direction of Mr. Hancock.

The balance-sheet presented herewith shews only a very slight decrease on last year as to balance in hand, £238 against £245.

In consequence of the resignation of Messrs. Marreco and H. Bowman, the Committee propose Capt. Andrew Noble and Wm. Dinning as Honorary Secretaries.

The following gentlemen have also resigned the post of Honorary Curators, namely,

D. P. Morison, G. S. Brady, H. B. Brady, H. Bowman, A. F. Marreco, and G. A. Lebour.

OFFICERS OF THE NATURAL HISTORY SOCIETY, 1875.

PATRON.

His Grace the Duke of Northumberland.

PRESIDENT,

The Lord Bishop of Durham.

VICE-PRESIDENTS.

Sir Walter C. Trevelyan, Bart.
The Rt. Hon. the Earl Ravensworth.
The Rt. Hon. the Earl of Tankerville.
Sir W. G. Armstrong, C.B.
A. J. B. Cresswell, Esq.
John Clayton, Esq.
Lieut.-Col. Addison Potter.
The Worshipful the Mayor of Newcastle.
Robert Ingham, Esq.
Ralph Carr-Ellison, Esq.
Rev. John F. Bigge.
I. Lowthian Bell, Esq.
R. S. Newall, Esq.
G. C. Atkinson, Esq.
D. Embleton, Esq., M.D.
John Hancock, Esq.
R. B. Bowman, Esq.

TREASURER.

Joseph Blacklock, Esq.

SECRETARIES.

Capt. Noble, R.A., F.R.S.
Mr. William Dinning.

COMMITTEE.

Mr. Thomas Bell.
Mr. E. Boyd.
Mr. N. C. Cookson.
Mr. John Coppin.
Mr. John Daglish.
Mr. R. R. Dees.
Mr. D. O. Drewett.
Mr. John Glover.
Mr. E. Joicey.
Mr. William Maling.
Mr. John Pattinson.
G. H. Philipson, M.D.
Mr. Jos. W. Swan.
Mr. C. Thompson, jun.

HONORARY CURATORS,

1875.

ZOOLOGY.

VERTEBRATA.

D. Embleton, M.D. | J. Hancock.

ARTICULATA.

W. Dinning.
J. Hancock.
Rev. A. M. Norman.

MOLLUSCA.

Rev. A. M. Norman.

RADIATA.

D. O. Drewett.
J. Coppin.
Rev. A. M. Norman.

BOTANY.

Rev. J. F. Bigge. | R. B. Bowman.

GEOLOGY.

E. Boyd.
E. J. J. Browell.
J. Daglish.
W. Dinning.
J. W. Kirkby.

GENERAL CURATOR.

Richard Howse.

KEEPER OF THE MUSEUM.

Joseph Wright.

THE TREASURER IN ACCOUNT WITH THE NATURAL HISTORY SOCIETY.

CURRENT ACCOUNT FROM 16TH JULY, 1874, TO 15TH JULY, 1875.

1874.	DR.	£	s	d.
July 16.	To Balance brought forward	245	2	7
1875.				
July 15.	,, Subscriptions from Members	133	0	0
	,, Ditto from Associates	5	15	0
	,, Literary and Philosophical Society (One Year's Subscription)	40	0	0
	,, Institute of Mining Engineers (One Year's Subscription)	20	0	0
	,, Fine Arts Society (One Year's Rent, due 1st August, 1874)	34	12	0
	,, Admissions	133	11	11
		£612	1	6

1875.	CR.	£	s.	d.
July 15.	By Salary to Keeper of Museum	90	0	0
	,, John Clayton, Esq., One Year's Interest on £2,000, less Income Tax	79	6	8
	,, One Year's Fire Insurance	15	0	0
	,, Tradesmen's Accounts	105	10	6
	,, Sundry Small Accounts	19	11	3
	,, Share of cost for Printing Transactions (with Tyneside Naturalist Field Club)	40	16	4
	,, Richard Howse, Curator's Account	11	13	0
	,, Fossils purchased by R. Howse	3	0	0
	,, Joseph Wright, of North Shields, for collection of Fossil Fishes, etc., from Marl Slate	5	0	0
	,, Hancock Memorial: Printing and Postage Expenses	4	2	3
	,, Balance in Bank	238	1	6
		£612	1	6

LIST OF DONATIONS TO THE MUSEUM

OF

THE NATURAL HISTORY SOCIETY,

FROM JULY, 1874, TO JUNE, 1875.

Proceedings of the Academy of Natural Sciences, Philadelphia, Parts 1, 2, and 3, 1873, and Parts 1, 2, and 3, 1874. *The Academy.*

Report of the Smithsonian Institution, 1872. *The Institution.*

Proceedings of the Natural History Society of Copenhagen for 1873. *The Society.*

Annual Report of the Leeds Philosophical and Literary Society for 1873-4. *The Society.*

Transactions of the Geological Society of Glasgow, Vol IV., Part 3; and Vol. V., Part 1. *The Society.*

Proceedings of the Zoological Society of London, Parts 2, 3, and 4, 1874; and Part I., 1875. *The Society.*

Annual Report of the Plymouth Institution, 1873-4. *The Institution.*

Proceedings of the Newcastle Chemical Society, Parts 1, 2, 3, and 4, Vol. III. *The Society.*

Communications to the Yorkshire Philosophical Society, 1873. *The Society.*

Illustrated Catalogue of the Museum of Comparative Zoology at Harvard College. No. 7, Part 4: Revision of the Echini. No. 8, Part 1: Echini, Crinoids, and Corals. Bulletin, Vol. III., Nos. 9 and 10. Annual Reports, 1872 and 1873.

Report on the Anderson School of Natural History, 1873.

From the Museum of Comparative Zoology, Harvard, Cambridge, Mass., U.S. America.

Report (1873) of the Explorations of the Colorado of the West and its Tributaries, by Prof. J. W. Powell. *The Smithsonian Institute.*

Proceedings of the American Philosophical Society, Vol. XIV., No. 92. *The Society.*

Proceedings of the American Academy of Arts and Sciences, Vol. I., New Series. *The Academy.*

Proceedings of the American Association for the Advancement of Science, Vol. XXII. *The Association.*

Report of the Commissioner of Agriculture, 1872. *From the Department of Agriculture, Washington, U.S. America.*

Annals of the Malacological Society of Belgium, Parts 1–8. *The Society.*

A Package of Transactions from the Royal Norske University, Christiania, Norway. *The University.*

Report of the Geological and Geographical Survey of Colorada, U.S. America, 1873. *Dr. F. V. Hayden, United States Geologist.*

BIRDS AND FISHES.

A Specimen of the Hooded Crow (*Corvus cornix*). *Mr. George Bold, Long Benton.*

A Specimen of the Golden Eye (*Anas clangula*) female. *John Coppin, Esq.*

Eleven Bird Skins from Brazil. *Master George Noble.*

A small Collection of British Birds' Eggs. *Cuthbert Thompson, jun., Esq.*

A Skull of an Albatross. *Mr. Carins, Byker.*

A Specimen of the Deep-nosed Pipe-Fish. *Master D. C. Morris, Pelaw Main.*

ANNULOSA.

Thirteen Specimens of Lepidoptera (*Papilio, Bombyx, etc.*). *Mr. Wassermann, Cullercoats.*

A few Specimens of Lepidoptera, from Montserrat, West Indies. *Mrs. Sturge, Montserrat.*

Twelve Specimens of Crustaceans (*Arcturus longicornis, etc.*), from Cullercoats. *Dr. W. B. Clarke, North Shields.*

A few Specimens of Echinodermata (*Spatangus purpureus, Amphidotus roseus* and *Echinocardium cordatum*), dredged off the Durham Coast. *Prof. G. S. Brady.*

MOLLUSCA.

A Specimen of *Sepiola Rondoletti*, taken at Whitley. *Master Charles Wylam, per Mr. R. Howse.*

A few Specimens of Land Shells from South Africa. *Mr. W. D. Sutton.*

A few Specimens of Land and Fresh-water Shells from Ceylon. *E. L. Mitford, Esq., Mitford.*

A few Specimens of Shells of the genera *Conus, Cyprea*, etc. *Rev. A. M. Norman.*

FOSSILS AND MINERALS.

A Collection of Fossils, from various formations. *A. G. Dew Smith, Esq.*

Specimens of Mammalian remains, consisting of bones and teeth, from phosphate beds, France.
Messrs. Spence and Irwin, per Mr. William Dinning.

Specimens of Coal Plants, from Dipton Colliery. *G. A. Lebour, Esq.*

Specimen of Iron Ore, from Larne, Co. Antrim.

Specimen of Vesicular Basalt, Collin Glen, Co. Antrim.

Specimens of Abnormal Crystals of Staurolite, from Coadry, Department of Finisterre, France. *G. A. Lebour, Esq.*

Specimens of Iron Ore, etc., from New Zealand.
J. C. Chaytor, jun., Esq., per D. O. Drewett, Esq.

Specimen of Magnesite from Sweden. *R. B. Bowman, Esq.*

Specimen of Sulphide of Antimony. *R. R. Redmayne, Esq.*

REPORT, JULY, 1876.

Your Committee, in presenting their annual report, have to say that the Museum continues in a satisfactory state, and that the various collections are being made more complete, as will be seen by the annexed list of donations and purchases.

Cabinets have been placed under the Coral case, in the Geological Room, for the accommodation of the increasing number of specimens.

The Hutton collection of Fossil Plants has been named and labelled, and the Species and Type specimens identified by Mr. Richard Howse.

Many fine specimens have been added to the collection of British Birds.

The Treasurer's statement shews that the finances of the Society are also satisfactory. The balance in the hands of the Treasurer is £274 13s. 6d., against £238 1s. 6d. last year.

The Professors of the College of Physical Science are not using our collections so much as formerly, having acquired a collection of minerals for their own use. During the last session they have had the use of more than three hundred specimens from the Museum, which, with one trifling exception, have been returned in good order.

The attendance of the public during the past year shows a trifling falling off in numbers, which, however, may be accounted for by the general commercial depression in the neighbourhood. The behaviour of the public has been uniformly good, no injury having been done to the property of the Society.

One evening meeting has been held during the last year, in connection with the Tyneside Naturalists' Field Club, at which the following papers were read :—

"*On the Head of Loxomma Allmanni,*" by D. Embleton, M.D., and Mr. Atthey.

"*On the Lepidoptera observed in* 1875," by Mr. W. Maling.

"*On the Larger Lepidoptera, observed near the mouth of the Tyne,*" by Mr. Wassermann.

"*On an Eagle Ray, from Cullercoats,*" by Mr. Joseph Wright.

A specimen of the Crane (*Grus cinerea*), shot near the Tees, has been presented to the Society by Mr. John Robson, West Hartlepool. This is the first recorded capture of the Crane in our district.

Mr. H. H. Slater, Riding Mill, has presented the leg bones and part of the pelvis of a Dodo.

A Peruvian mummy was received, a few days since, from Mr. James Stoddard, Backworth.

The late Mr. Albany Hancock's collections of *Tunicata, Cephalopoda,* and *Clionæ,* also a number of Marl-Slate Fishes, have been presented to the Society by the Misses Hancock.

The Society has acquired, by purchase, Mr. Atthey's collection of Fossil plants, numbering about three hundred specimens.

A fine skeleton of *Dinornis crassus* has been received from the Otago Museum, New Zealand, in exchange for Carboniferous and other fossils.

OFFICERS OF THE NATURAL HISTORY SOCIETY,

1876.

PATRON.

His Grace the Duke of Northumberland.

PRESIDENT.

The Lord Bishop of Durham.

VICE-PRESIDENTS.

Sir Walter C. Trevelyan, Bart.
The Rt. Hon. the Earl Ravensworth.
The Rt. Hon. the Earl of Tankerville.
Sir W. G. Armstrong, C.B., F.R.S.
A. J. B. Cresswell, Esq.
John Clayton, Esq.
Lieut.-Col. Addison Potter.
The Worshipful the Mayor of Newcastle.
Ralph Carr-Ellison, Esq.
Rev. John F. Bigge.
I. L. Bell, Esq., M.P., F.R.S.
R. S. Newall, Esq., F.R.S.
G. C. Atkinson, Esq.
D. Embleton, Esq., M.D.
John Hancock, Esq.
R. B. Bowman, Esq.
Col. Joicey.

TREASURER.

Joseph Blacklock, Esq.

SECRETARIES.

Capt. Noble, R.A., F.R.S.
Mr. William Dinning.

COMMITTEE.

Mr. Thomas Bell.
Mr. E. F. Boyd.
Mr. N. C. Cookson.
Mr. John Daglish.
Mr. D. O. Drewett.
Mr. R. R. Dees.
Mr. John Glover.
Mr. Edward Joicey.
Mr. William Maling.
Mr. John Pattinson.
Mr. A. S. Stevenson.
Mr. Joseph W. Swan.
Mr. Cuthbert Thompson.
Mr. Thomas Thompson.
Mr. Henry Watson.

HONORARY CURATORS,

1876.

ZOOLOGY.

VERTEBRATA.

D. Embleton, M.D.	J. Hancock.

ARTICULATA.

W. Dinning.	Rev. A. M. Norman.
J. Hancock.	

MOLLUSCA.

Rev. A. M. Norman.

RADIATA.

D. O. Drewett.	Rev. A. M. Norman.
J. Coppin.	

BOTANY.

Rev. J. F. Bigge.	R. B. Bowman.

GEOLOGY.

E. Boyd.	W. Dinning.
E. J. J. Browell.	J. W. Kirkby.
J. Daglish.	

GENERAL CURATOR.

Richard Howse.

KEEPER OF THE MUSEUM.

Joseph Wright.

THE TREASURER IN ACCOUNT WITH THE NATURAL HISTORY SOCIETY.

CURRENT ACCOUNT FROM 15TH JULY, 1875, TO 7TH JULY, 1876.

Date	Dr.	£	s.	d.
1875.				
July 15.	To Balance brought forward	238	1	6
1876.	,, Subscriptions from Members	155	3	0
	,, Ditto from Associates	3	0	0
	,, Literary and Philosophical Society	40	0	0
	,, Institute of Mining Engineers	20	0	0
	,, Fine Arts Society (One Year's Rent, due 1st August, 1875)	34	12	0
	,, Admissions	132	0	8
	,, W. T. Moor (Two Years' Rent for liberty to place joists in the wall of the Museum building)	1	0	0
	,, W. T. Moor (One Year's Rent for Chronicle Signboard)	2	0	0
	,, Error overpaid into Bank on 22nd May.	0	3	0
		£626	0	2
July 7.	,, Balance brought down	£274	13	6

Date	Cr.				£	s.	d.
1875.							
July.	By One Year's Salary to Keeper of Museum				90	0	0
	,, John Clayton, Esq., One Year's Interest on £2,000 Mortgage, less Income Tax				79	6	8
	,, One Year's Fire Insurance				15	0	0
	,, W. T. Moor, on account				100	0	0
	,, Sundry Small Accounts				27	4	6
	,, John Bell, Printer, on account of						
	Natural History Society	1	6	9			
	Hancock Memorial	1	13	9			
					3	0	6
	,, Richard Howse, Curatorship Account				36	15	0
	,, Balance in Bank				274	13	6
					£626	0	2

LIST OF DONATIONS TO THE MUSEUM

OF

THE NATURAL HISTORY SOCIETY,

FROM JUNE, 1875, TO JUNE, 1876.

Proceedings of the Bristol Naturalists' Society, Vol. I., Parts 2 and 3. *The Society.*

Proceedings of the Berwickshire Naturalists' Club, Vol. 7, Parts 2 and 3. *The Club.*

Smithsonian Institution Reports, 1873 and 1874. *The Smithsonian Institution.*

Proceedings of the Academy of Science, St. Louis, Vol. 3, No. 2. *The Academy.*

Proceedings of the American Philosophical Society, Vol. XIV., Nos. 94 and 95; and Transactions, Vol. XV., Part 2. *The Society.*

A Packet of Pamphlets on Geological Subjects, by Charles T. Gaudin and others. *Thos. F. Deacon, Esq., per Dr. Embleton.*

Proceedings of the Natural History Society of Glasgow, Vol. 1., Part 2. *The Society.*

Proceedings of the American Association for the Advancement of Science, August, 1874. *The Association.*

Proceedings of the Zoological Society of London, Parts 3 and 4, 1875, and Part 1, 1876. *The Society.*

Proceedings of the American Academy of Arts and Sciences, Boston, Vol. II., New Series. *The Academy.*

Publications of the United States Geological Survey:—Copes' Cretaceous Vertebrata; Lesquereux's Cretaceous Flora; Coue's Birds of the North-West; Geological and Geographical Survey of Colorado, 1874; Bulletin of the Geological and Geographical Survey of the Territories, Vol. II., Nos. 1, 2, and 3; Annual Report of the United States Geological and Geographical Survey, 1874. *Dr. F. V. Hayden, United States Geologist, Washington.*

Memoirs of the Boston Natural History Society, U.S. America, Vol. II., Part 3, Nos. 3, 4, 5; and Part 4, No. 1. Proceedings, Vol. XVI., Nos. 3, 4; Vol. XVII., Nos. 1, 2, Memorial Meeting. *The Society.*

Archives of Science and Transactions of the Orleans County Society of Natural Sciences, U.S. America, Vol. I., Nos. 6 and 7. *The Society.*

Dr. Coue, U.S. Army ; On the Study of the Genera Geomys and Thomomys. *United States Government.*

Annual Report of the Leeds Literary and Philosophical Society, 1874–5. *The Society.*

Transactions of the Watford Natural History Society, Parts 1, 2, and 3. Vol. I. *The Society.*

Proceedings of the Literary and Philosophical Society of Liverpool, 1874–5, No. 29. *The Society.*

Der Isis, January to December, 1875. *Dr. Geinitz, Dresden.*

Transactions of the Plymouth Institution, etc., Vol. V., Part 2. *The Institution.*

Transactions of the Clifton College Scientific Society, Vol. II., Part 1. *The Society.*

Illustrated Catalogue of the Museum at Harvard College, U.S. America, No. 8 ; and Annual Reports, 1874 and 1875. *Professor Alexander Agassiz.*

Annals of the Malacological Society of Belgium, Vol. 9. *The Society.*

A Set of Transactions of the Royal Swedish Academy. *The Academy.*

MAMMALIA.

A Peruvian Mummy, from Arica. *Mr. James Stoddart.*

BIRDS.

Nests of the Carrion Crow and Red-Backed Shrike. *Master George Noble.*

Small Collection of Birds' Nests, from the neighbourhood of Boldon. *Mr. Richard Dickenson, Boldon.*

Specimen of the Crane (*Grus cinerea*), shot at Dyke House Farm, on the Hart Estate, near Hartlepool, May, 1865. *Mr. J. E. Robson, Hartlepool.*

REPTILIA.

Skin of the Boa-Constrictor. *A Northumberland Gentleman.*

Six Bottles containing Snakes, etc. *R. T. Lightfoot, Esq.*

FISHES.

Specimen of the Viviparous Blenny, taken in the Tyne, at Elswick. *Mr. James Stephenson.*

Specimen of the Eagle Ray (*Myliobatis Aquila*), taken at Cullercoats, November 5th, 1875. *Purchased.*

A Specimen of the Hippocampus, and also one of the Trunk Fish. *Mr. William Lyall.*

MOLLUSCA, ETC.

Specimens of varieties of *Helix nemoralis*, from Islay.

R. Y. Green, Esq.

Specimen of *Eledone cirrhosus* taken at Whitley. *Mr. D. H. Wilson.*

Two Specimens of the Locust taken at Alnmouth.

Mr. Henry Coppock and Mr. George Hedley.

A Hornet's Nest, taken at Oatlands Park, Surrey. Also a Wasp's Nest, taken in Northumberland. *Mr. John Hancock.*

A Selection from the Collection of the late Mr. Albany Hancock, consisting of Cephalopoda, Clionæ, Marl-Slate Fossil Fishes, etc.

Mr. John and the Misses Hancock.

FOSSILS AND MINERALS.

A few Fossil Shells from the Valley of the Vistula. *Mr. Adolph Eicholtz.*

A Fossil Fish, from the Marl-Slate, Whitley. *Mr. Gibson.*

Specimens of Stigmaria, from the Brockwell Seam, Elswick Colliery.

Mr. James Stephenson.

Portion of Stem of Encrinite, from the Carboniferous Limestone, Haltwhistle. *Mr. T. P. Barkas, F.G.S.*

Skull of Boar, found in digging a foundation in Orchard Street.

Mr. W. T. Moor.

A Sternal Plate of Ichthyosaurus from the Lias.

Henry Maddison, Esq., The Lindens, Darlington.

A Specimen of Sulphur from New Zealand.

Mr. James Carlaw, 95, Henry Street.

A Collection of Bones of the Dodo, from the Mauritius.

H. H. Slater, Esq., Riding Mill.

Specimens of Trilobites, in Oil Shale, from Collingwood, Ontaria, Lake Huron; and Magnetic Iron Sand from Rothsay Bay, Bute.

Mr. D. C. Glen, Glasgow.

Specimens of Natural Coke, from a Whin Dyke, Low-Main Seam, Cramlington Colliery. *Mr. Robert Linsley, Cramlington.*

INDEX TO VOLUME V.

LIST OF ILLUSTRATIONS, VOL. V.

* The Photographic Illustrations of the Catalogue of Remarkable Trees are published separately by special subscription. Parts 1, 2, and 3 have been issued.

PRINTED BY JOHN BELL AND CO., RAILWAY BANK, PILGRIM STREET, NEWCASTLE-ON-TYNE

CORRIGENDA.

Page	10,	line	9,	for	*caronus*,	read	*canorus.*
,,	12,	,,	6,	,,	sacriligious,	,,	sacrilegious.
,,	38,	,,	29,	,,	*urtica*,	,,	*Urticæ.*
,,	39,	,,	23,	,,	*Chœrocampo*,	,,	*Chœrocampa.*
,,	40,	,,	2,	,,	*Hylemia*,	,,	*Hybernia.*
,,	41,	,,	11,	,,	*nombella*,	,,	*nimbella.*
,,	41,	,,	11,	,,	*Stigmonola lutulana*,	,,	*Stigmonota lunulana.*
,,	41,	,,	24,	,,	*alshallmeriella*,	,,	*alstrœmeriella.*
,,	41,	,,	24,	,,	*nœnosella*,	,,	*nervosella.*
,,	41,	,,	25,	,,	*heracluella*,	,,	*Heracliella.*
,,	104,	,,	20,	,,	Hing's,	,,	King's.
,,	111,	,,	13,	,,	Whem,	,,	When.
,,	143,	,,	16,	,,	*Satysus*,	,,	*Satyrus.*
,,	143,	,,	21,	,,	*Polyomnatus phlœas*,	,,	*Polyommatus Phlœas.*
,,	144,	,,	1,	,,	*Hespialus*,	,,	*Hepialus.*
,,	144,	,,	8,	,,	*Ampsshydasis*,	,,	*Amphydasis.*
,,	144,	,,	14,	,,	*imataria*,	,,	*imitaria.*
,,	144,	,,	15,	,,	*Macana*,	,,	*Macaria.*
,,	144,	,,	19,	,,	*nunata*,	,,	*nanata.*
,,	164,	,,	12,	,,	Amboglauna,	,,	Amboglanna.
,,	171,	,,	23,	,,	*excelsa*,	,,	*Morinda.*
,,	180,	,,	32,	,,	gallinacious,	,,	gallinaceous.
,,	182,	,,	2,	,,	resembles,	,,	resemble.
,,	243,	,,	20,	,,	occuring,	,,	occurring.
,,	246,	,,	21,	,,	satifaction,	,,	satisfaction.
,,	246,	,,	32,	,,	Harry-holm,	,,	Airy Holme.
,,	249,	,,	13,	,,	form,	,,	from.

Page 247, line 21, for 1022, read 1057.

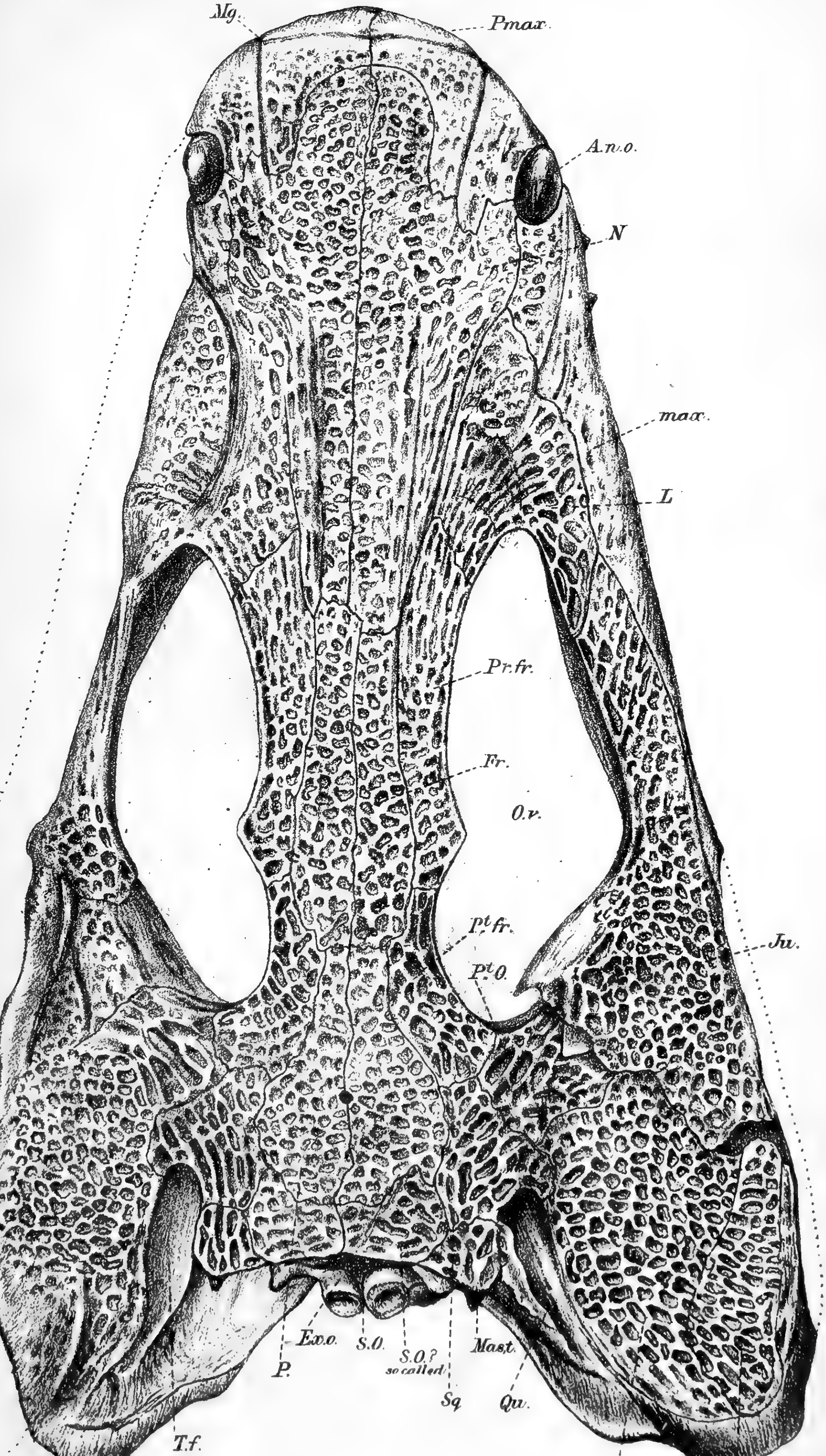
,, 251, ,, 12, ,, Streonoshalh or Streaneshalch.

,, 251, ,, 13, ,, 240, ,, 188.

,, 252, ,, 5.—NOTE.—Mr. Howse has mentioned to me that no remains of Pterodactyle have been found in Yorkshire; and in Tate and Blake's recently published work, "The Yorkshire Lias," this fact is still more strongly stated. These authors believe that some Pterodactyle bones in the Jermyn Street Museum, which are said to have come from Yorkshire, are really from Lyme Regis.

Page 280, line 34, for *Ribœana*, read *Ribeana.*

,, 281, ,, 7, ,, *Argyrostoza*, ,, *Argyrotoza.*



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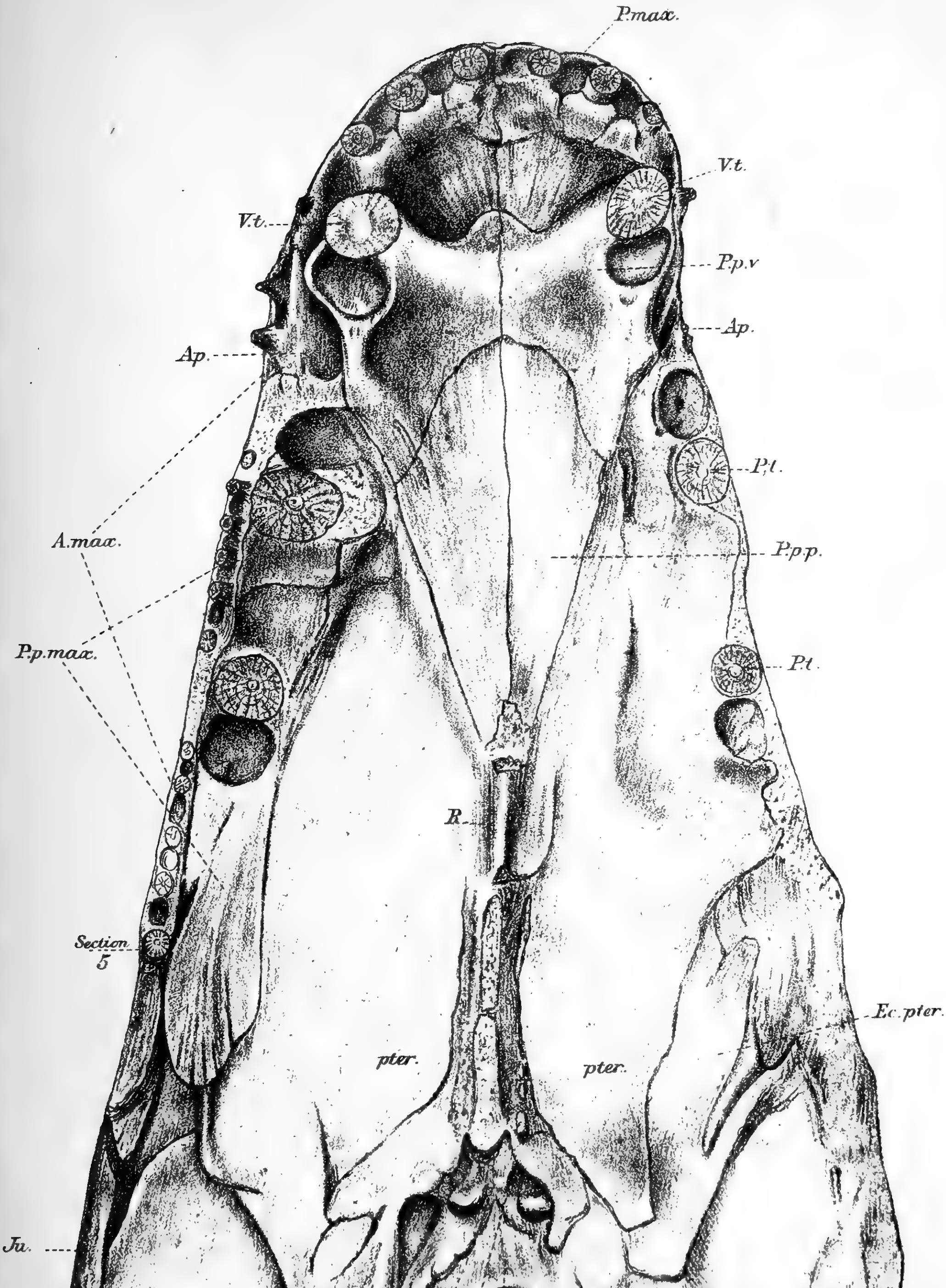
LOXOMMA ALLMANNI. HUX.



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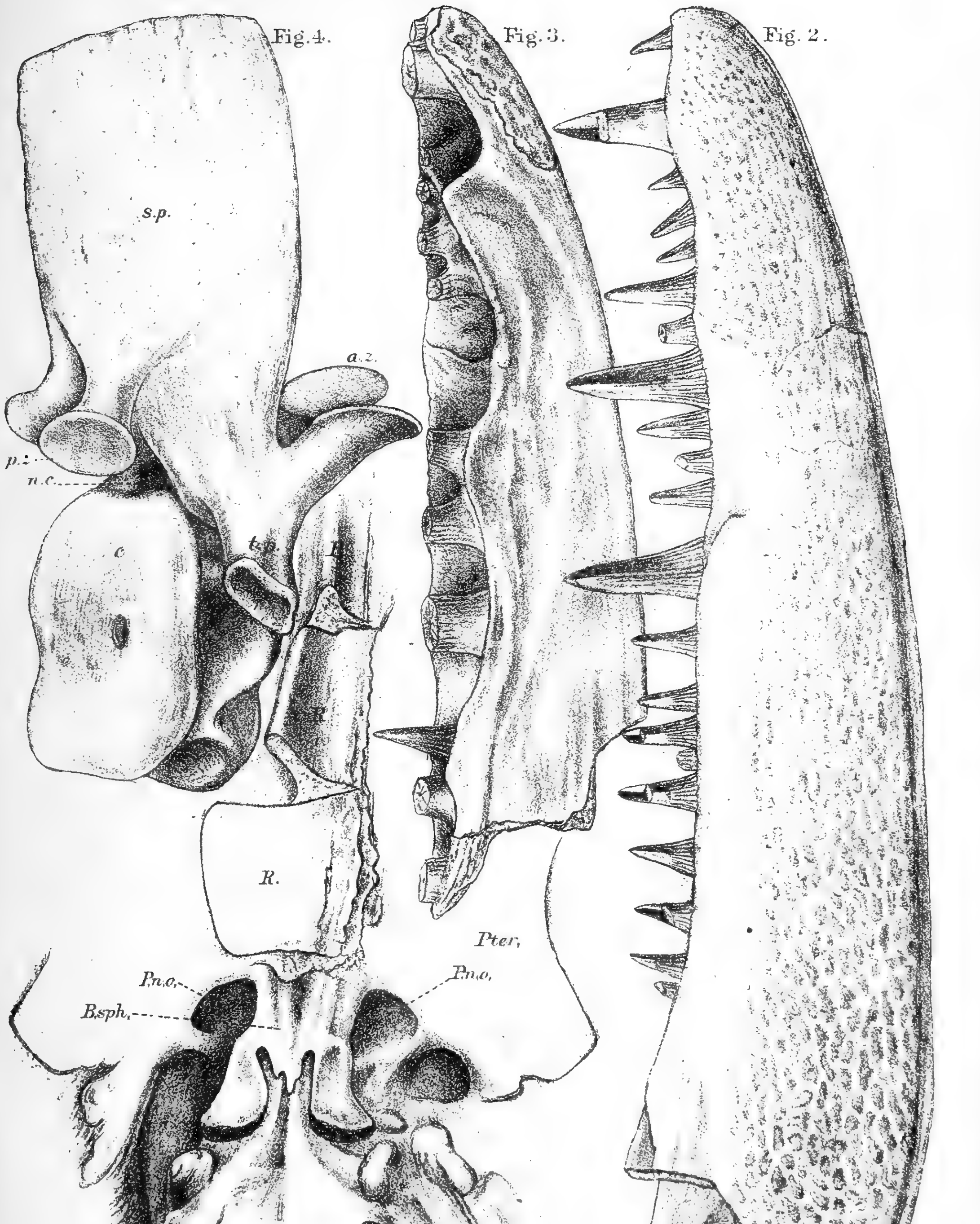

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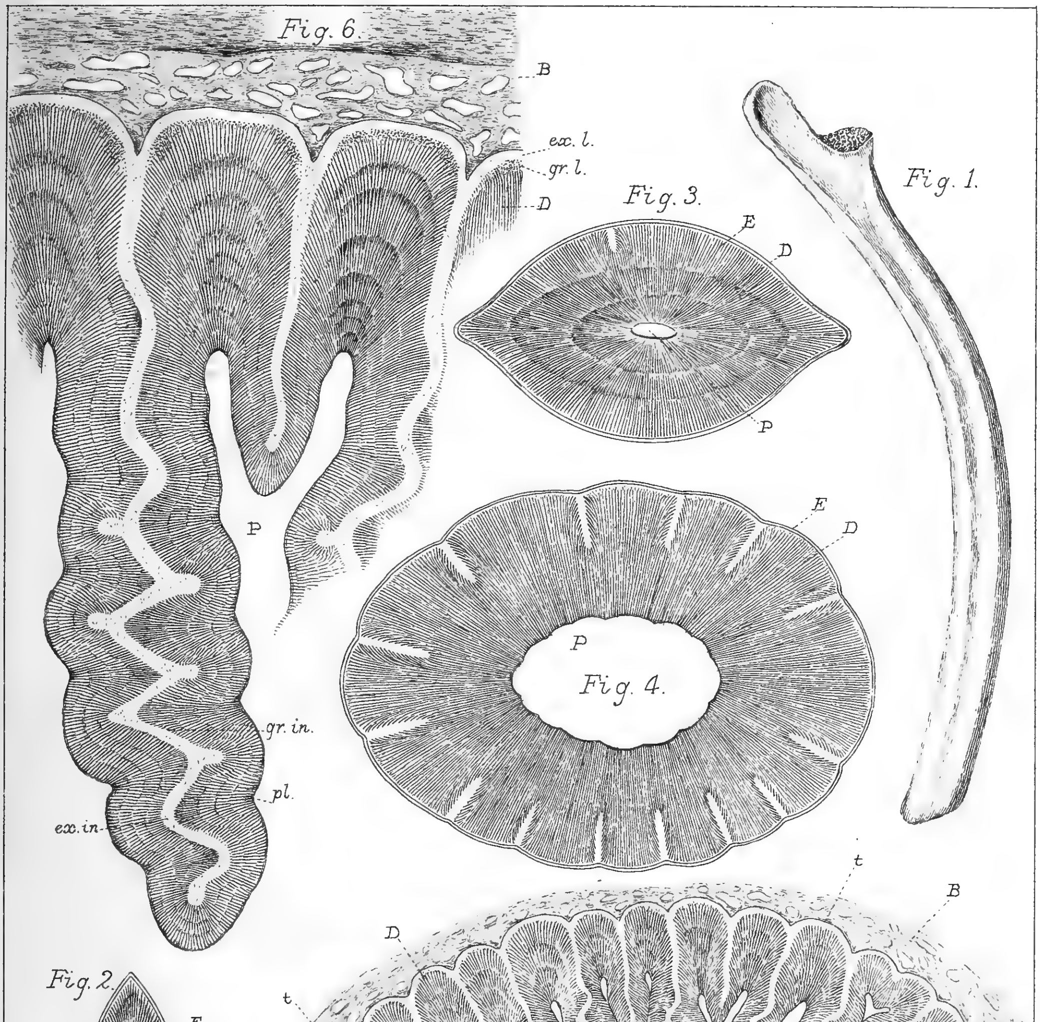
LOXOMMA ALLMANNI HUX



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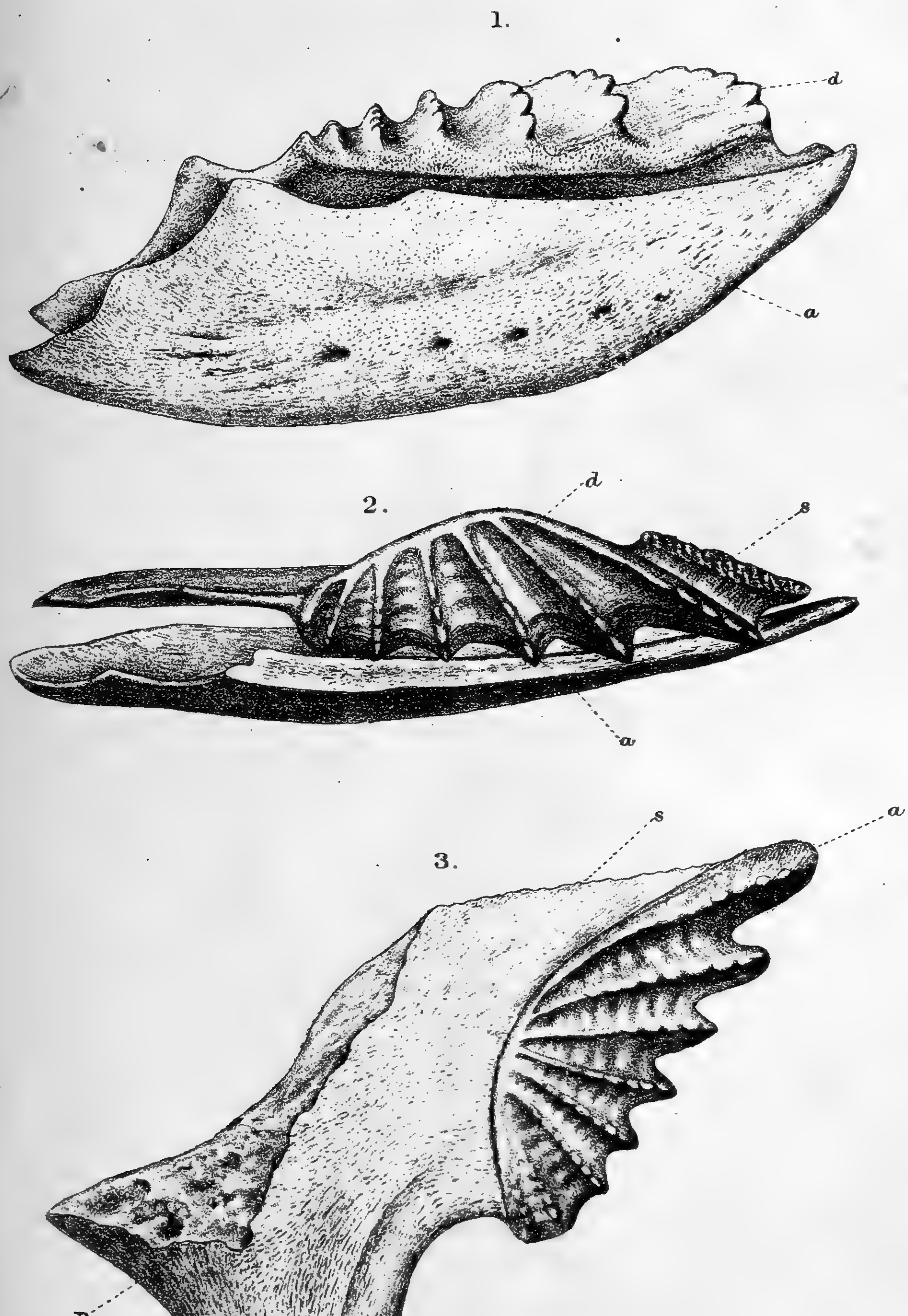

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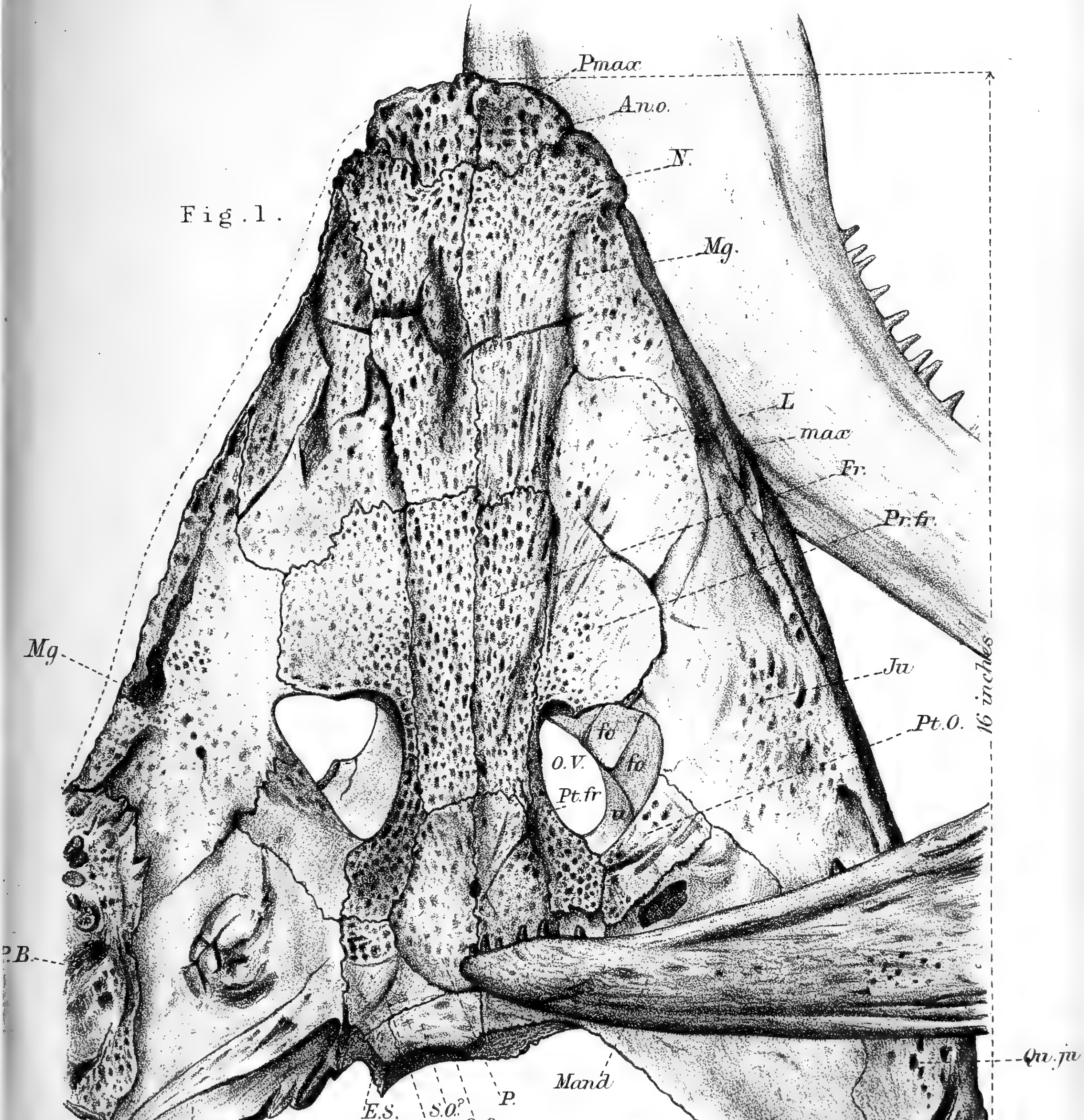
CTENODUS OBLIQUUS.

Fig. 1.



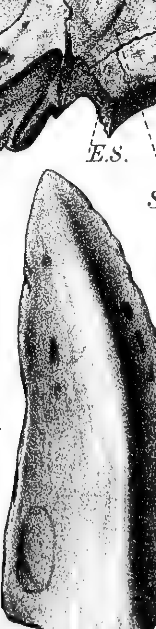


Fig. 2.

Fig. 3.

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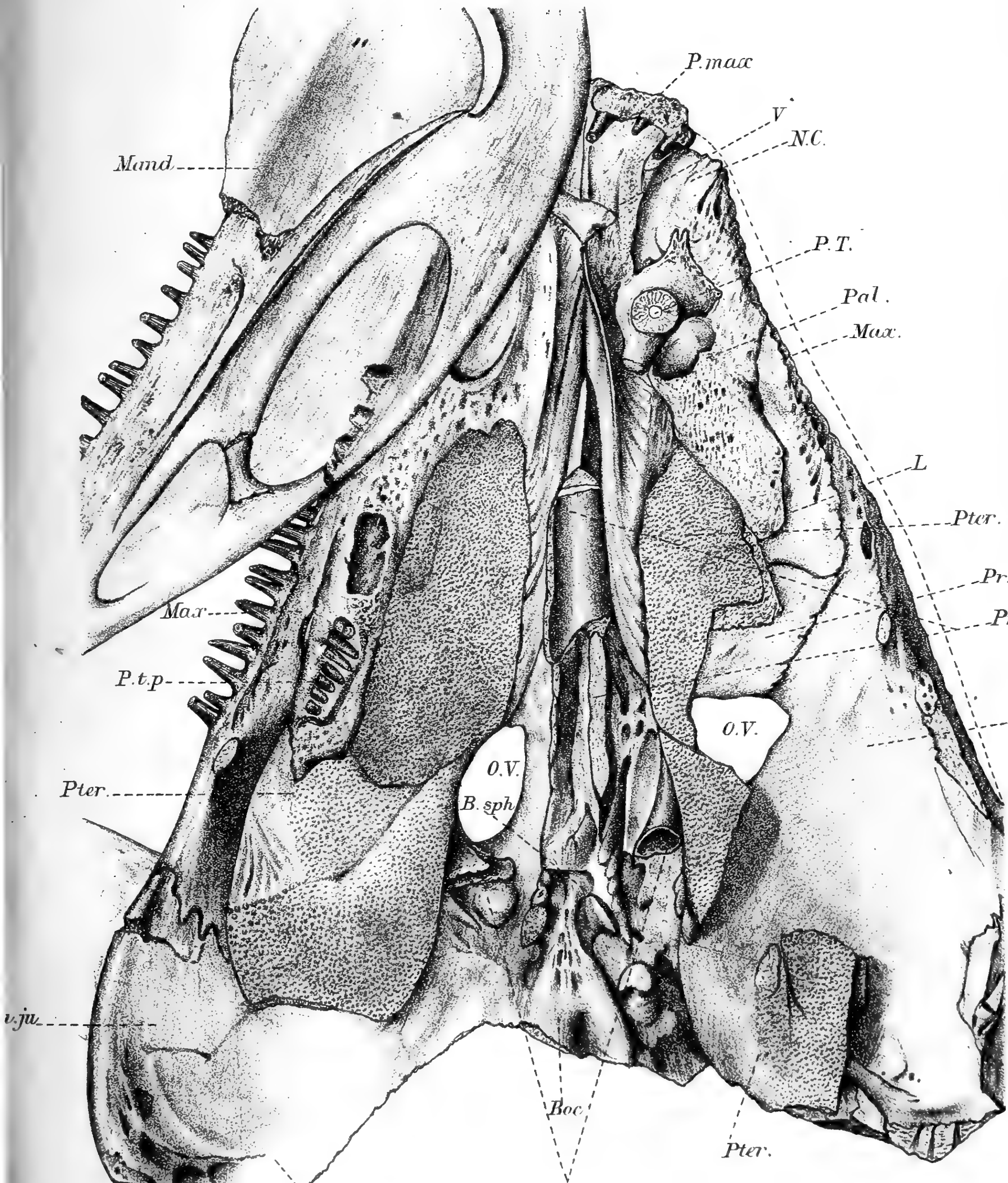

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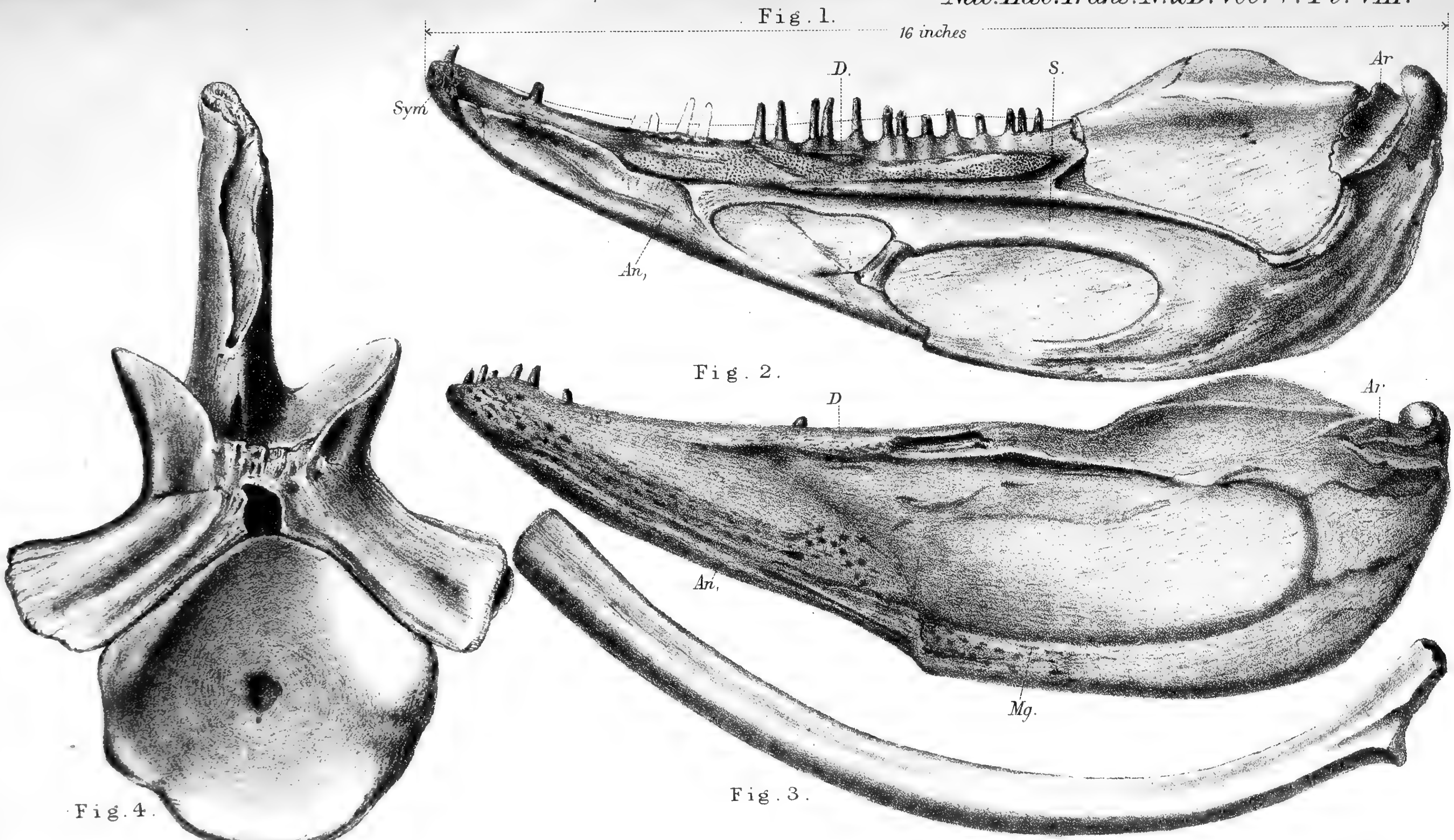

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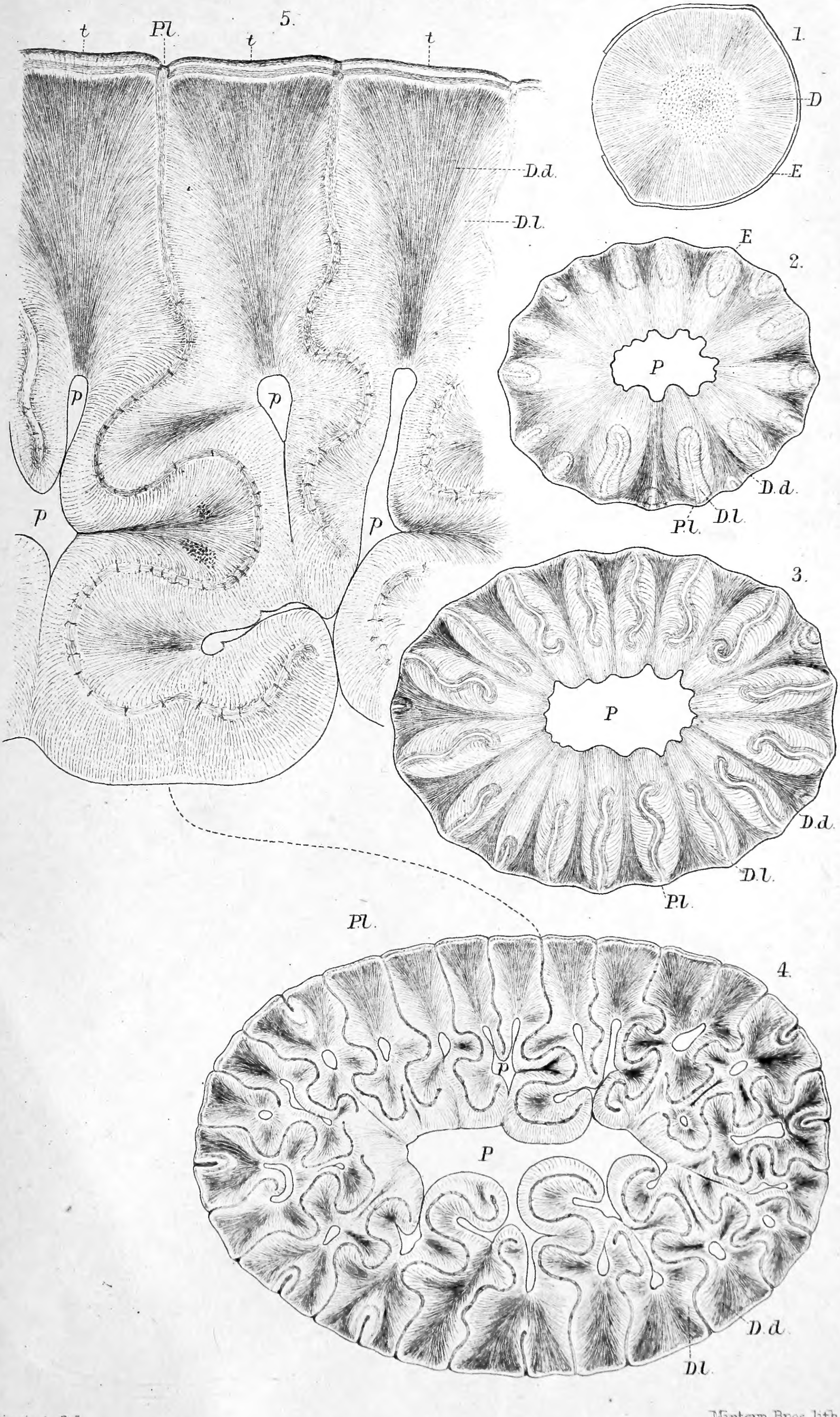

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